GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Gas Amalgamations and Municipal Embroidery.

An inquiry which was held by the Director of Gas Administration (Mr. J. F. Ronca) into the application of the Harrogate Gas Company, to extend their area and to purchase three small non-statutory gas companies, and the undertaking of the Knaresborough District Council (see *ante*, p. 228), raised the subject of the protection of the internal consumer—that is, the consumer in the old area of supply. No question was introduced as to the outdistricts not benefiting by being linked-up with the larger and more economically gas-producing concern. The Harrogate Gas Company have a good record. They have already proved the advantage of connecting-up outside areas—proved that it is good public policy; and they made out at the inquiry an excellent case for the further extension. Among other things they asked for a maximum differential charge of 8d. per therm for use to the extent required in assuring that a price was paid commensurate with the service rendered, and adequate for themselves as suppliers. The estimates of prospects of further consumption indicate that the extra cost of supplying the added areas would not exceed by more than 6½d. per therm the cost within the existing limits. Therefore, 8d. provides a good margin. As to Knaresborough, the Company are convinced that the price there could be, and should be, the same as in Harrogate. But the Harrogate Corporation are solicitous for the safety of the consumers in the borough—in fact, unduly solicitous, seeing that they are, as electricity suppliers, in competition with the Gas Company for new business. The Corporation, therefore, asked that separate accounts should be kept for the added areas, thus attempting to complicate the operations of the Company. The attributed object of their request was that from these separate accounts they might ascertain whether, in any year, any part of the cost of the new "burden" was falling upon the Harrogate consumers; if so, the Board of Trade could increase the differential prices to the other areas in order to protect the consumers in the borough. This is almost humorous; it suggests that the Corporation, friendly though they profess their relations are with the Company, think the Directors quite capable of playing hanky-panky tricks. That is not a friendly spirit. Extensions and amalgamations of this kind are in accordance with the policy of the Government in several directions; and it would be a great pity if, when there is a clear case that no injury can be done to anyone by carrying out a policy which is to the general public benefit, there should be anything in the way of irksome conditions placed upon those who are seeking to confer such benefit.

It was considered by Mr. Arthur Valon, who was the expert witness for the Corporation, that the maximum differential price of 8d. would be ample; but the fear is that the Company might be tempted to be so unbusinesslike as to charge an insufficient differential, which would be to the detriment of the Harrogate consumers. There does not, however, appear to have been any evidence as to the extent that the Harrogate consumers were likely to be financially prejudiced in the event of the Directors of the Company acting uncommercially in respect of the gas supply to the outer areas. The point is worth some examination. In 1925, the consumption in the districts which it is proposed to take over was 71,000,000 c.ft. In Harrogate the consumption was 471,000,000 c.ft. Supposing the Harrogate Gas Company foolishly choose to lose on the business in this new area 1d. per 1000 c.ft., then 71·000d. ÷ 471,000 M.c.ft. would give 0·15d. per 1000 c.ft. (or 0·0326d. per therm), which would be the "burden" falling upon the Harrogate gas consumers. Knowing the Harrogate Gas Company as we do, we are satisfied they are not going to let their old consumers suffer even to the extent of an avoidable 0·15d. per 1000 c.ft. Moreover, we do not anticipate sterility in those areas. Whether gas is made for Harrogate or the outside districts, the cost of the gas into the holders is the same; and there are economies even to that point which come from increased make. The better and cheaper service the Company will be able to give to the outer consumers from the concentration of production (which has been proved by experience in many places in the gas industry to be an excellent thing for all concerned) will tend progressively to reduce the cost of transmission and the other charges specially applying to the service in the outer areas. The difference in the cost of transmission is really the only material item. This all indicates that the Corporation were making "much ado about nothing" at the inquiry; and, to say the least, their attitude was not altogether complimentary to the business acumen of the Company's Directors and their Engineer and General Manager, Mr. Frank H. Robinson—their friendly relations notwithstanding.

There must be some reason for this attitude. What is it? Seeing how minutely the Harrogate consumers could suffer per 1000 c.ft. in the worst event; seeing how (having regard to all the experience we have had in the gas industry) they will participate in the enjoyment of any economies which larger business may produce—what really moved the Corporation to ask for separate accounts being kept for the purpose already explained? We hardly like to suggest that it is due to the fact that the Corporation are the owners of the electricity undertaking, that as such they are jealous of the Gas Company, and that, therefore, they are not averse to trying to obtain a little cumbering embroidery to the new powers of the Gas Company, which they would not think of seeing as against themselves in connection with the electricity undertaking. They have in hand an Order for an extension scheme for their electricity concern; and it includes Knaresborough and other parishes. In this Order, they are making no provision for any differential price as between those areas and Harrogate, nor have they any legal right to charge more. But what about the poor Harrogate electricity consumers? Will they not be injured? Who is going to defend them? Is it not just as likely that the Corporation Electricity Department will supply at figures in the outside areas which will cause a portion of the "burden" to fall upon the Harrogate consumers as that the Gas Company will do so? The Company are making provision for differential prices; the Corporation are not. This being so, why try to impose a condition upon gas which does not apply to electricity? Considering the large number of municipal electricity supply undertakings there are in this country trading in opposition to gas companies, it would be doing gas an ill-service if the Board of Trade concede the request

of the business competing Harrogate Corporation, and impose the condition for which they asked. There is no genuine reason why they should.

Nothing should be done that will in any way put a restriction on the policy of area extension and production consolidation to the advantage of the communities in both the old and the new areas. Such extensions and amalgamations have been endorsed by Parliament over and over again in the case of gas undertakings. The new gas legislation projected by the National Gas Council proposes to facilitate them. Similar extensions and fusions—particularly in respect of generation—are fundamental to the Government electricity scheme. Like amalgamations have been carried out in the case of railways and water supplies. Large industrialists favour the policy as sound, in which connection there is the recent example of Imperial Chemical Industries, Ltd. Furthermore, municipal corporations continue to propose extensions of their administrative areas. Sir Kingsley Wood, Parliamentary Secretary to the Ministry of Health, the other day stated that a notable feature of the local legislation during the present session was the considerable number of Bills promoted by local authorities for the extension of their boundaries. In all there were no fewer than fifteen of such measures. Economy and efficiency promoting expansion is the order of the day. Examine the question how we will, we see every reason for the Government and the Board of Trade doing all possible to encourage, and not to retard by imposing unnecessary conditions, the fusion of the smaller with the more economically worked larger gas undertakings. We see no reason in this Harrogate case, nor should we in any other where there is such plain mutual advantage in the scheme, for any useless embroidery—such as the provision for complicating separate accounts—being attached, as proposed by the Harrogate Corporation, to the powers of enlarged supply, because they fear consumers may be injured, which in these competitive times would mean injury to the Company.

The Secondary Products Limitation.

It looks as though we are likely to have a revival of the contest with the chemical manufacturers regarding the working-up of the secondary products of coal carbonization. The original fight took place some fifteen years ago; and it resulted in a model clause to which the gas industry has never taken kindly. The clause limits the purchase by a gas undertaking from any other concern of like bye-products to one-third of the quantity produced by the buyers themselves. On the other hand, it allows the purchase from other gas undertakings and elsewhere, and the use of materials required to work-up and convert the secondary products; but it denies those undertakings upon which the clause is imposed the manufacture of chemicals exclusively from raw materials purchased from sources other than gas undertakings, or in the manufacture of which the use of residuals produced by the undertaking or purchased from any other undertakings is merely subsidiary. We will not go over the old arguments on this occasion, but simply make reference to the recent development of the question.

In the Bill which the South Staffordshire Mond Gas Company introduced into Parliament this year, was a clause (17) which provided for the Company manufacturing and storing, and supplying, selling, and dealing in oxygen, hydrogen, nitrogen, carbon dioxide, carbon monoxide, ammonia, methane, ethylene, acetylene, sulphuric acid, hydrochloric acid, nitric acid, acetic acid, chloride of ammonia, and nitrate of ammonia. During the progress of the Bill, the words "ammonia, chloride of ammonia, and nitrate of ammonia" were deleted from the clause; and now the clause has been completely abandoned in these circumstances: When the Bill came before the Unopposed Bills Committee of the House of Commons, they found considerable difficulty in knowing what was their proper course in relation to these new powers. They consulted various Government Departments; but there did not appear to be any great objection on their part. The Committee, however, came to the conclusion that they would give the Company the option of withdrawing the clause, and allowing the Bill to go forward at once for third reading, or having its final consideration postponed to the autumn. The Company, not desiring to run the risk of the remainder of the Bill being hung-up, decided to accept the proposal as to the withdrawal of the doubtful clause, so that the Bill could proceed. Some knowledge regarding the ideas of the Committee is obtained from a special report which they have presented on the subject. In this they regard as important the powers sought to manufacture gases which have not hitherto been granted in a Private Bill. They, however, point out that the advisability of allowing such powers by statute, and the effect which the grant of them would have upon non-statutory chemical manufacturers and the chemical industry, has not been inquired into; and they have no powers which would enable such an inquiry to be effectively conducted. They therefore decided not to take the responsibility of allowing the section to proceed, but were unanimously of opinion that the matter is of such importance that an inquiry should be instituted before a Committee properly equipped for the purpose.

That is the position so far as it affects the South Staffordshire Mond Gas Company. Looking at the evidence which the Director of Gas Administration (Mr. J. F. Ronca) gave to the Committee, as reported in our issue for July 27 (p. 225), we trace in it that the Board of Trade had no particular objection to the Bill, even with the clause in it. On the contrary, they appeared to think that the powers sought might be of advantage in the interests of the country. The only point which, so we gather from Mr. Ronca, interested the Board was that, if the clause was granted, the Company would have statutory powers to carry on manufacturing operations outside what might be called public utility operations; and on this point the Board had not formulated any very definite opinion. But there can be little doubt as to the tendency of the Board's view in this relation. It was admitted by Mr. Ronca that, although the restricting residuals clause (to which we have already made reference) was placed upon gas undertakings, he did not know that the Board were not inclined to the view that it might be well to extend rather than continue to restrict the powers. This was a broad-minded statement; and it will be appreciated by the gas industry. It is as clear to us now, as it was at the time the restricting clause was imposed, that everything points to the need for the greatest economy and efficiency being obtained in every direction in the country's work; and, therefore, there should be no restriction whatsoever to the fullest value being derived from the secondary products of coal carbonization by gas undertakings, in order that the greatest public benefit may be given in respect of the primary service. Mr. Ronca also mentioned that the matter might be considered in conjunction with the legislative proposals which had been put forward by the National Gas Council, and which had been referred to the National Fuel and Power Committee. This intimation, combined with the opinion of the Unopposed Bills Committee that "the matter is of such importance that inquiry should be instituted before a Committee properly equipped for the purpose," gives good ground for the anticipation that before long the conditions as between the carbonizing industries and the chemical manufacturers will again be under review.

The Part of Gas Workers.

There have been many reviews during the past half-year of the experiences which 1926 brought to the gas industry; and among them is the evidence of good relations with the general workers—practically only a few craftsmen and transport workers were temporarily disloyal. In the credit for this, apart from the fealty of the workers themselves, should be included the wisdom of the leaders of the Unions represented on the Joint Industrial Council for the Gas Industry and the influences of co-partnership—the latter in respect of a great number of workers, although, relatively speaking, not in respect of a great number of undertakings. Last year, when other industries were dislocated, and unemployment was rife in them, although the gas industry was carried on at enormous cost, its workers were maintained in full

employment at their normal rates of pay, to say nothing of their other benefits.

There is a lesson in this—a lesson of the value of close co-operation between administrations and workers at all times, whether the conditions be good or bad. If ever there was a normal time when the heartiest co-operation was necessary between employed and employers in the gas industry, that time is now; and herein is work for the trade unions as well as for the employers. The work of the trade unions should not be confined to the making of new programmes for wages and hours, knowing as the leaders do full well that much of that for which they ask is outside the ability of the industry to give, and still maintain its financial stability, business, and strength of employment; each trade union would be rendering good service to its own members by doing all possible to protect and advance the interests of the industry which give those members employment. The railway unions see this; the road transport workers' unions see the same thing. Their interests in the matter of employment are not identical, owing to their methods of conveyance being competitive. Fair wages and fair value in work for wages are, of course, essentials; but during the last few years we have been learning a great deal about how labour can influence the costs of production, how costs of production influence the volume of business, and how the volume of business affects the volume of employment. What applies generally to industry in these respects applies to the gas industry among the rest. Thus the relationships of, and the considerations for, the workers in the gas industry go much deeper than the securing of increments of wages and concessions in other directions beyond the capacity of the industry—such as were contained in the national petition which was presented to the employers, and was under consideration when the industrial turmoil commenced last year, and which resulted in the stabilization of wages to June 30 this year, though it was conceded that this should not prevent (1) any readjustments which might be agreed upon arising from the inquiry into gasfitters' rates and conditions, (2) Regional Councils from dealing with the regrading of any particular undertaking, and (3) the exercise of the right of the trade unions to approach Regional Courts or individual undertakings to endeavour to obtain further holiday concessions.

Such matters as these do not compass the interests of gas workers. Those interests extend much farther; and what is wanted is (the point is very much neglected) that effort should be made to inculcate the truth that the stability of the industry is a matter of genuine concern to them in relation to employment, in respect both of volume and constancy. The wages which were paid to gas workers during the coal stoppage were only made possible through charging the consumers higher prices for gas; but for those prices there was then justification in the heavy costs of foreign coal to keep the supply of gas going. Had it not been for that foreign coal, the gas supply could not have been maintained; and gas workers would not have had employment. But the industry and its workers have since seen that, even though there was the justification for the higher prices for gas, the public were quick to grumble furiously at them when the coal stoppage came to an end, and before the high-priced coal account had been discharged. It is perfectly clear from this that the public are of opinion that they are now paying, though reductions have been made to pre-stoppage figures, a price sufficiently high for the applications to which gas is being put to-day in increasing quantities. That point should be marked in looking to the future and its conditions, and to the stabilizing and increasing of employment in the industry. The line of greatest future progress for gas undertakings is found in heating; and for heating we must have cheap therms. If we do not, our rate of development will suffer. If our coal, coke, electricity, and oil competitors find the resisting and developing power of the gas industry is on the wane, that will be their opportunity and advantage. Gas workers have to do their part in co-operating to increase the potency of the gas industry in meeting competition, which is growing in keenness and strength. The workers have no doubt heard a great deal about the Government electricity scheme, and what is hoped from it; they have probably learned of the expanding competition with coke, tar, and sulphate of ammonia. All these things do not lighten the work of the administrations of the industry; but they do point to the necessity for our gas workers contributing to the utmost of their ability, through co-operation, to the defence of the industry which gives them employment.

We have strenuous times ahead; but they can be met if we all pull together—if the workers will say heartily: "We are in this, and we will do our part in seeing our "industry through, and in helping to maintain and elevate "its position." The chief thing is that the heating business—cooking, and room, water, and industrial heating—requires cheap gas. Good value in work for fair pay will do much to subscribe to this, and to the advantage of the volume of employment within the industry.

"E.D.A. Circle Campaign."

THE gas industry has not observed that anything abnormally different has occurred to it owing to the intensive "Wiring of British Homes" Campaign which ran through the six months from October to March last. It continues to make new connections, and to add to its business scope. Apparently the results of the campaign were not all that the electricity industry had hoped for. If this is so, there can be no surprise, for it was a most inopportune time for an effort of the kind, with the country in the state of turmoil which then prevailed through the coal stoppage. However, those at the head of the Electrical Development Association consider that another six months' campaign as a "follow-up," from October to March next, would be a good thing, which suggests to the observer that those behind electrical movements in this country are realizing that an extraordinary amount of boosting is needed for headway to be made in domestic electrification—notwithstanding the remarkable virtues of electricity, according to the gospel of the electricity purveyors. The title of the last essay—"Wiring of British Homes" Campaign—sounded a bit fantastic, and it led some of the more enthusiastic ones to sit down and count how many British homes there were still without electric wiring. The result showed how relatively few had been wired, and the vast field there was still to conquer, if people could be induced to believe that a therm supplied electrically was as cheap and reliable as a therm supplied by gas, and that the appliances with which the electrical therm is used are as cheap to purchase, instal, and maintain as the appliances by which the gas therm is used. The counting did not stop there. Some people who had not anything better to occupy their time made estimates as to the revenue that would be obtained from the wiring of all unwired British homes, and how much would be spent on appliances if a miracle happened. We do not remember whether anyone calculated the quantity of electricity that would be consumed, and all else it would mean for the electricity industry if these majestic things came to pass, which they are not likely to do. The 1926-27 campaign fortunately put a barrier to further flights of imagination.

The 1927-28 effort is to be called the "E.D.A. Circle Campaign." A little enlightenment should be given as to why this title has been selected; but we are left to surmise. The Electric Lamp Manufacturers' Association are not, in respect of organization; united with the "E.D.A." on this occasion; and so the Association are left to manage the project alone. Last year, it will be remembered, there were 123 Electrical Circles established in different parts of the country. These were composed of all electrical interests in the territory to which they applied; and their work was to plan and promote the local organization on the general lines proposed from headquarters. It seems to us that a greater share of the obligations, financial and otherwise, of the forthcoming venture will fall upon the Circles in existence, and those new ones which may have birth during the next two or three months. It does not appear that on this occasion there will be any big public competition, with a £2000 prize at the top, and many little ones following on. But there will be national advertising, for which, we take it, "E.D.A." will be responsible. Architects, builders, and teachers are to be pointedly attacked. There is to be a special week's effort for promoting business in

Christmas and New Year's electrical gifts. Demonstration houses, which proved such a popular feature last year, are to be an item in this year's scheme. A national canvass is proposed; where this cannot be undertaken, a direct mail circular is to be issued. A "national canvass" can only mean that the ambition is that every home in the country shall receive an electrical visitor at least once during the six months. Literature in abundance is in preparation at headquarters, the responsible officers at which hope that their enterprise will receive its due reward. An attempt is to be made to capture the General Press of the country as allies in the campaign. The contemplated strategy is to arrange for a luncheon—after the form of the Rotary Club luncheons—in every electric (and therefore gas) supply area on Oct. 3 (the day of the opening of the campaign), at which an address will be given relating to its objects and the aspirations of the industry.

Other details will be found in our "Electric Supply Memoranda" to-day. Among other things which will be noted is that the slogan for the campaign is to be "For Health's Sake—Use Electricity." The reply to that is: "For the Sake of your Health, Pockets, Temper, and Comfort—Use Gas."

Gas-Works Effluents.

The recent discussion in the House of Lords on the pollution of rivers has prompted the Duke of Montrose to write to "The Times" on the subject of the effluents from the carbonization of coal. He cannot agree with the Earl of Balfour that it is impossible economically to extract the ammonia from such effluents by any process at present known to industry. The Duke says there does "exist a simple and certain means of relieving the effluents of all ammonia present after distillation by a chemical reaction." He adds that the cost is trifling. Like the serial novel, the Duke's letter leaves off just at the point where the reader would like it to go on. He omits to give any details of the process.

Coal Outputs.

The recent weekly coal outputs have not been up to the average per man that was experienced earlier in the year; but this must not be taken to mean that the men are slacking-off. It is not so. The cause is the decrease in demand and consequent short-time working—in fact, some pits have had to be closed-down entirely. In the week ended July 2, the production was 4,848,900 tons, with the workers of all grades numbering 1,004,800; July 9, 4,846,300 tons, and 1,001,900 workers; July 16, 4,851,100 tons, and workers 999,600.

Fuel Research Expenditure.

Just before the House of Commons rose for the summer vacation, Mr. C. Edwards asked for information regarding the total expenditure on fuel research during the past five years. The Parliamentary Secretary to the Board of Education (the Duchess of Atholl) circulated the particulars in the "Official Report." The net expenditure has been: 1922-23, £46,772; 1923-24, £42,751; 1924-25, £48,142; 1925-26, £76,147; 1926-27, £88,350. The figures show that the increase in expenditure considerably exceeds the £30,000 authorized by the late Government; but the work has been largely extended.

Trade Disputes Act.

The Attorney-General (Sir Douglas Hogg) thinks that experience will undoubtedly show that the effect of the Trade Disputes Act will be to benefit, rather than to injure, organized labour. It will be found that the Act will not interfere in any way with the use of the strike weapon in legitimate trade disputes. What it will do is to prevent any attempt to dissipate the funds of trade unions by a misuse of their powers for revolutionary purposes. Trade unionists now know that the only strike prohibited by the Act is one whose object is not purely industrial, but is intended to coerce the community. With the knowledge that a strike with that object is a criminal offence, it will no longer be possible for them to be misled into taking such action. Nor will there be any necessity to apply to the Courts to stop the abuse of trade union funds for the support of what is really a political and not an industrial strike. The Act does not interfere with peaceful picketing; but it affords real protection against intimidation and coercion. Any member of a trade union who wishes to do so can contribute to its political funds for the furtherance of Socialism; but those who do not desire to subscribe can belong to their appropriate unions without incurring any liability to pay money for the support of political doctrines which they detest, and believe to be fatal to the best interests of the nation.

British Association.

The annual meeting of the British Association for the Advancement of Science is approaching. It is to be held in Leeds from Aug. 31 to Sept. 7, under the presidency of Sir Arthur Keith. It is expected that there will be an attendance of at least 2500. The full programme is not yet available; but it is understood that, in the aggregate, the scientific communications, addresses, discourses, discussions, and papers will number about 300. That will be a healthy output. How far "JOURNAL" readers will be specially interested cannot yet be said; but it is noticed from the general information to hand that the supply, utilization, and chemistry of coal will have prominence. A departure is being indulged in on this occasion which, it is hoped, will form a precedent. Though the Association always concerns itself with the economic and industrial interests of the localities where it meets, it has not hitherto arranged a complete series of communications on the applications of science to a particular leading industry. Meeting in Leeds, a programme on textiles has been compiled, which will involve the interests of physicists, chemists, economists, and engineers. This has been done in collaboration with the British Research Association for the Woollen and Worsted Industries and the Leeds University. There will be an exhibition of scientific apparatus, and addresses and public lectures on a variety of subjects.

Combining Business and Pleasure.

Those interested in the problems of industry and commerce who wish to combine a holiday with business have an ideal opportunity to do so by attending the Third International Congress of Scientific Management, which is to take place in Rome from Sept. 5 to 8. Signor Mussolini has consented to act as Hon. President of the Congress, to which the King of Italy is giving his patronage. Four classes of problems connected with scientific management will be discussed: (1) Industries and trade in industrial products. (2) Agriculture and trade in soil products. (3) Public services and public utilities. (4) Domestic economy. These subjects will be dealt with by four separate sections, and the resolutions arrived at will be submitted to a final meeting of the Congress as a whole. They will deal with such questions as maximum production, factory lay-outs, labour-saving devices, time-studies, and administration systems, for public authorities as well as manufacturing units. The subscription fee to the Congress is nominal. Persons attending may send in papers on the subjects under discussion. These should deal preferably with practical cases, and results obtained from the application of the principles of scientific management. The Reception Committee have made arrangements for visits to the chief places of interest in ancient and modern Rome—the Vatican included. We are asked to state that anyone requiring further information can obtain it through the Production Department of the Federation of British Industries, 39, St. James's Street, London.

Trade Unions and Russia.

The Congress in Paris of the International Federation of Trade Unions has been rather a lively one; and it has inflicted a sad blow upon the extremist members from this country. Mr. Purcell is the President; and he appealed for a remodelling of the Federation, so that it could include Russian workmen. He also showed considerable enthusiasm for the Chinese revolution and the Soviet régime. This displeased the majority of the delegates; and there was bitter criticism of the Bolshevik sympathies. A good example of the criticism is found in the speech of M. Mertens, of Belgium, who deplored the penetration of the influence of Moscow, just as the Federation was making itself felt in the trade union organizations of the various countries. He hoped the Congress would find a remedy. Whether it did so, we have not yet seen.

PERSONAL.

Mr. JAMES WILSON, Assistant Manager of the Ardrossan Gas-Works for the last three years, has been appointed Manager of the Dalry Gas-Works.

Major ALEXANDER L. S. WOOD, a son of the late Chairman, the Rt. Hon. T. McKinnon Wood, has accepted the invitation of the Directors of Messrs. Glover & Main, Ltd., and the allied Companies Thomas Glover & Co., Ltd., and R. & A. Main, Ltd., to join the Boards of those Companies.

Hearty congratulations to Mr. JAMES MELROSE, who celebrated his 99th birthday on the 5th inst. He has been a Director of the York Gas Company since December, 1883. Mr. Melrose regularly attends the Board meetings, and continues to enjoy the wonderful health in which many readers of the "JOURNAL" will with pleasure recall having seen him on the occasion of the Company's centenary celebrations in March, 1924.

Mr. HERBERT P. CHANT, late Distribution Superintendent to the Redcar Corporation, has been appointed to a similar position under the Morecambe Corporation. He previously held the position of Senior Inspector under Mr. Westlake, of Exeter. Before Mr. Chant left Redcar, the Mayor, Alderman S. Hill, J.P., on behalf of the staff, presented him with a magnificent oak bureau. After expressing his good wishes for Mr. Chant's success in his new appointment, the Mayor thanked him for the excellent work he had carried out during his nine years in Redcar.

Announcing the retirement of Mr. FRANK BAILY from the position of Coke Manager, the "Co-Partnership Journal of the South Metropolitan Gas Company" says: Mr. Baily was for many years Chief Engineering Clerk, for twelve years under the late Mr. Frank Livesey, for about eight years under Dr. Carpenter, and afterwards under Mr. Doig Gibb. Since the war he has devoted his energies to the important business of the disposal of the Company's great output of coke; and now, after over 42 years' service, he is leaving the office with a record of work well done, and with the good wishes of many friends. Outside the circle of his official duties, Mr. Baily has an excellent record of voluntary work.

FORTHCOMING ENGAGEMENTS.

Aug. 16-17.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual meeting at Cork.
Sept. 7-9.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting in Dumfries.
Sept. 13.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.
Sept. 13.—FEDERATION OF GAS EMPLOYERS.—Meeting.
Sept. 16.—GAS SALESMEN'S CIRCLES.—Annual meeting in London.
Sept. 22.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION.—Meeting at Porthcawl.
Sept. 23.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the Torquay Works of the Torquay and Paignton Gas Company.
Sept. 30.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Annual meeting at Cambridge.
Oct. 3-5.—BRITISH COMMERCIAL GAS ASSOCIATION.—Sixteenth annual general meeting and conference at Southampton.
Oct. 27.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn general meeting, Grand Hotel, Birmingham, at 2.30.

INSTITUTION OF GAS ENGINEERS.

Sept. 12.—Finance Committee.
Sept. 12.—Council meeting.
Sept. 12.—Visit to the Shipping Engineering and Machinery Exhibition at Olympia.
Sept. 13.—Education Committee.

ELECTRICITY SUPPLY MEMORANDA.

THE Electrical Press is doing its best to boost the second six months' campaign which is being planned by the Electrical Development Association, and is to extend from October to March next. It is to be known as the "E.D.A. Circle Campaign;" and we rather think the idea is to run it on more economical lines so far as the central organization is concerned, and for the main financial obligation to rest upon the local undertakings. The principal part to be taken by the "E.D.A." appears to be to plan, advise, nationally advertise, and prepare and publish suitable literature. The title for the campaign rather indicates that this is the idea. There are already 123 Circles in existence. These are composed of representatives of supply authorities and electrical contractors; and they, in consultation, are supposed to advise and develop projects for the stimulation of the electrical business. Other Circles, it is stated, are being formed; and it is hoped that more will be established before the advent of October.

A Circle Campaign.

Objects of the Campaign.

The scheme for the campaign is an extensive one, and offers items which, it is believed, will appeal wholly or in part to every undertaking in the land. The main goal is to enlarge the domestic load. This is the official presentation of the objects:

(1) To secure new domestic connections at a more rapid rate.
(2) To educate the public upon and popularize the domestic uses of electricity other than, as well as, lighting.
(3) To create a definite demand for all kinds of domestic electrical appliances.
(4) To make all domestic connections, particularly recent ones, as remunerative as possible.
(5) To push all applications for which supply rates and facilities are favourable.
(6) To concentrate on small applications only where mains and/or charges do not at present encourage the full use of electricity in the home.
(7) To sum up: To increase activity in all branches of the industry, to the ultimate advantage of everyone—employers and employees—and therefore requiring and providing somewhere in the scheme for the active support of, and participation by, everyone engaged in every section of the electrical industry.

These objects are the day-by-day ones of the work of the gas industry; and we had been under the impression they were also the normal objects of the electricity supply industry. Apparently they are not; and in its case it requires a special campaign to bring into operation such ordinary activities in business. A series of booklets is to be issued which will deal in detail with these matters.

The Programme and Luncheons.

Briefly reviewing the programme of the campaign, national advertising is to be carried out in a large number of papers; and combined Circle advertisements will appear during the weeks Oct. 15 to Feb. 4. A series of 26 model advertisements will be circulated, which will cover the entire objects of the scheme. The national slogan adopted for the campaign is "FOR HEALTH'S SAKE—USE ELECTRICITY." Upon this slogan the gas industry can expand in several truthful directions. Direct appeals are to be made during the six months to architects, builders, and teachers. It is also suggested that the Circles might give the campaign a proper send-off by organizing a luncheon in each area, to which the local Press should be invited, on the lines of the popular Rotary Club luncheons. The starting day for the new effort is Oct. 3; and on that day some hotel proprietor or caterer in each locality should make a little harvest by having the good fortune to be selected for providing the lunch. If the hotel keeper happens to have a gas-cooking equipment, we suggest that he should be instructed not to pay any heed to the temperatures he uses in cooking the luncheon; and that everything should be done to a cinder so that the moral might be pointed at the luncheon, and apologies be made for the promoters having been let-down in this way through gas. Of course, the fact that the reporters present probably use gas in their households, and know what can be done with it, is a point which can be neglected. Dec. 3 to 10 is a week that is set apart for "National Electric Week"—a week in which to boom domestic appliances as ideal and sensible Christmas and New Year's gifts. Prior to this "E.D.A." will circulate a quarter of a million leaflets, entitled "What the Electric Week means to the Electrical Worker." Demonstration houses are again to be encouraged. There seems to be an idea at headquarters that a few hints regarding propriety in conduct are required by local electrical men. The advice is given to the organizers of the demonstration houses that they should make friends with the public; that there should be warmth in their reception; and that the disposition should be cultivated to give visitors every scrap of information for which inquiry is made. We hope the lesson will be heeded, even if inquiries are made which may be a little bit awkward. However, that is the programme; and in unison our electrical contemporaries have raised their voices in a profession of belief that this new attack on existing domestic conditions will do much to increase the prosperity of the electrical industry.

A Weymouth Cooker Experience.

When one thoroughly considers the points raised in a letter by Mr. Lionel G. Hill in "The Electrician," there is more in them than appears on the surface. It is obvious that he is not pleased with the electric

cookers on the market, and that he knows of much in the way of domestic electric apparatus that is inefficient. Mr. Hill has been to Weymouth, where he finds that some time ago a municipal housing scheme was started, and the dwellings were completely equipped for electric service. The cookers installed, so he alleges, completely ignored all the known accurate principles of economic cooker design; and manifestly it was left to the consumers to find out the best way to use them, without any assistance. The "inevitable" result was that the consumers soon discovered that the cost of cooking was exorbitant—in fact, according to one housewife, it was costing 3s. to cook a meal for four persons! The Gas Company offered to instal free gas cookers; and, so far as Mr. Hill was able to ascertain, there was not a single person who did not take advantage of the offer. The word "inevitable" implies, taken in conjunction with the context, that an extraordinary amount of supervision is needed in order to keep electric cooking cost as low as possible. Mr. Hill tells how he experimented for one household, and showed how it is possible, "by proper use," to cut the power bill down from 3s. to rather less than 1s. Previously, he stated that the 3s. was for cooking a meal for four persons; and with other agents 1s. would be still "exorbitant" for a meal for four persons. But, of course, these were naughty cookers, which ignored all "the known accurate principles of economic cooker design." We all know this case is not an isolated one—that in most towns the gas undertakings have had good experience of "electric cookers which serve as tables for the preparation of food to be cooked in gas-ovens;" and we do not for a moment suppose that all these derlict electric-cookers are of the type used at Weymouth.

Suggested Changes in Design.

Mr. Hill proceeds to make suggestions respecting cooker design. Speaking of the work on the hotplate, he says that it is common knowledge that efficient heating can only be effected by thin, flat, enclosed elements, with machined faces on both the heating surfaces and the bases of the cooking utensils. Costly heat demands great refinements in service. But there is a more important aspect in Mr. Hill's opinion, and that is, if electricity for cooking purposes is adequately to hold its own with gas, the three-heat regulation must be scrapped, and a nearer approach to the economic regulation with gas must be achieved. He says the problem is capable of easy and economic solution if engineers care to give it a few minutes' thought. This is a point upon which we have touched on previous occasions. The fixed heats of the electric cooker are a distinct disadvantage, both economically and for obtaining those niceties of temperature which are requisite for fine oven and hotplate work in the range of cooking operations. We have heard chefs say that they cannot with electrical operation get, as with gas, the required degrees of operating temperature which are of such vital importance to them in realizing the best results. In cooking, no two classes of food, for the best results, need precisely the same temperatures. The three-heat regulation is therefore, through the lack of elasticity, a decided disadvantage. Concluding his letter, Mr. Hill considers that it would be wiser to spend "a little more time and thought in designing and producing economical apparatus rather than to launch expensive sales campaigns, for the purpose of increasing the sale of inefficient apparatus." Will the promoters of the "E.D.A. Circle Campaign" please note this frank expression of opinion, which probably is shared by others who have not had uniformly good experience (if publicly unconfessed) with electric cookers among the residents in their areas. Most consumers are not electrical experts; and they do not want a method of cooking which demands more personal attention from them than is the case with other agents.

Mr. Cramb and the Contractors.

In the "Memoranda" for July 27, we referred to the growing feeling there is among electrical contractors that section 48 of the Electricity (Supply) Act of 1926, they gave away too much—especially in respect of the adoption of hire-purchase by local authorities, which they are apprehensive now will deprive them of the profit on a good many direct sales of apparatus. Allusion was also made to the reference back by the Croydon Borough Council to the Electricity Committee of a recommendation regarding an assisted wiring and hire-purchase scheme. The Electrical Contractors' Association, in a letter to the Press, repudiated any share in this defeat; but at the same time they accused Mr. A. C. Cramb, the Electrical Engineer, of having departed from a pledge he had given to the local contractors, when discussing an assisted wiring scheme, that nothing should be added to it without first consulting them. Then came the addition of the hire-purchase project. This looked as though Mr. Cramb had broken his word. It is only fair to Mr. Cramb, as we alluded to the letter from the Contractors' Association, to say that, in a published letter, he states that he withdrew his promise at a meeting consisting of the President of the Contractors' Association and the local contractors which he was asked to attend at the request of the Joint Conference responsible for the drafting of section 48. His reason for withdrawing the promise was because of the action of the Croydon Contractors in getting the Chamber of Commerce to approach the Town Council, with a view to a resolution being passed against the exercise of any of the powers in section 48, while he was, at the same time, in negotiation with them for putting forward a mutually agreed scheme under the section.

Cheap Current for Water Heating.

Mr. George Wilkinson has given in the "Electrician" some further information regarding his "change circuit" system, which, as we understand it, is a proposal to use, in conjunction with a two-part tariff, current, not required for other purposes, for water heating mainly for use for domestic purposes and low-temperature room heating. In his view, as change circuits add nothing to the maximum demand charge, "out of bounds" units from them may be sold at an attractive figure—say, 2·5 KW.-H. for 1d. That is a remarkably low figure. It would be interesting to know in how many cases it would pay for the coal used in generation, let alone any of the other costs. Low-priced current is not everything. Mr. Wilkinson obviously visualizes equipment which will not represent low cost—necessary for use even with current at the price of about 0·33d. He says, in order that a supply may confer the maximum benefit upon the community, all thermal storage apparatus should be under dependable automatic control, the leading features being: (1) That no boiling with consequent waste of current can take place. (2) That the supply to any storage vessel should automatically cease when the arranged maximum temperature is reached. (3) That the thermal storage apparatus should be effectively protected against cooling losses. (4) That when used for room or apartment heating, the emission of heat must be under effective control, with means stopping it entirely when the apartment is not in use. (5) That the storage apparatus has high electrical insulation, so as to protect the change circuit from leakage, or from ill-effect on the ordinary networks. It will be seen from this that electricity managements, contemplating the adoption of the change circuit for their own benefit, would show generosity if they also considered the cost which would be imposed upon consumers for making the necessary provision to allow of the scheme becoming effective. Even the heat of the low-priced energy must be carefully protected, in order that there shall be no waste or damaging leakage. However, Mr. Wilkinson is catholic in his views. He states that the use of surplus electricity for heating purposes by storage methods will not have any serious detrimental effect upon the call for other methods employing gas or coke.

Costs and Losses.

We are exceedingly grateful for the consolation which those last words give us; but we would venture to suggest to Mr. Wilkinson that he has erred somewhat in a succeeding passage of his article. He says that at the rate of 3 KW.-H. per 1d., the cost compares favourably with that of gas; 3 KW.-H. being equal to 10,200 B.Th.U. Gas at 10d. per therm equals 10,000 B.Th.U. a 1d. This comparison assumes that both heating agents can be applied with equal efficiency; but Mr. Wilkinson remarks: "It is well-known that with gas there is waste due to the hot products of combustion going up the flue to atmosphere, equal to about 40 p.ct. of the total heat units generated by its combustion. In the case of electricity, there is a heat loss due to storage to deduct. This, however, in any well-arranged installation will be small compared with the amount of heat dissipated by the flue in the case of gas. Therefore electricity, apart from its greater convenience and safety, at the price named, is a cheaper heating agent than gas." We are sorry to see Mr. Wilkinson writing in this way. In the first place, gas at 10d. per therm is not a standard rate any more than is 0·33d. per KW.-H. for a domestic purpose. There are undertakings supplying gas to-day at round about 6d. per therm, which gives close upon 17,000 B.Th.U. for 1d. How is Mr. Wilkinson going to compete with that even on the lines of his three-a-penny units? His 40 p.ct. loss of heat up the flue as applied to water heating is not correct as a general figure. The efficiency of the open type gas geyser may be taken to be 90 p.ct.; the closed type, 75 p.ct.; and the gas circulator, 60 p.ct. These are methods of water heating which will give all the water required at any time of the day, without the cumbrous method of storage which Mr. Wilkinson proposes to place upon the premises of the electricity consumer. Modern ideas of how to develop the domestic business of electricity supply undertakings usually show a decided leaning towards making the consumer pay heavily for the benefit of the electricity concern.

Mishaps.

Among recent fatalities which have come to knowledge through the Press is one at Camborne. A motor mechanic named Bishop was working at a Camborne garage, when he was heard to call for help. He was found unconscious, with a lampholder attached to a flexible in his hand. The floor was wet. It was stated at the inquest that the voltage was 240 a.c. The lampholder, it was asserted at the inquest, was not insulated or earthed, and so did not comply with the regulations. "Accidental death" was the verdict.

INSTITUTION OF PUBLIC LIGHTING ENGINEERS.

Fourth Annual Conference and Exhibition, Brighton, Sept. 12 to 15.

The following are the main features of the programme for the forthcoming annual conference of the Institution, which is to be held in Brighton.

PROGRAMME.

Monday, Sept. 12.—6.30 p.m., Council meeting in the Pavilion.

7.30 to 8 p.m., reception in the Corn Exchange by the Mayor of Brighton, Councillor Richard Major, J.P.

8 to 10 p.m., exhibition open in the Corn Exchange.

Tuesday, Sept. 13.—9.45 a.m., opening of session at the Pavilion and official reception to the members and delegates by the Mayor. List of new members.

Induction of new President, Mr. Alex. C. Cramb, M.I.E.E., M.I.Mech.E. (Electrical Engineer and General Manager, County Borough of Croydon), who will deliver his Presidential Address.

Paper on "Standard Specification for Street Lighting," by Capt. L. B. W. Jolley, Research Engineer, Research Laboratories, G.E.C., Wembley; and Mr. Robert Watson, Engineer and Manager, Corporation Gas Department, Doncaster.

1 p.m., luncheon, by invitation of the Chairman, Mr. A. M. Paddon, M.Inst.C.E., and Directors of the Brighton and Hove Gas Company, in the banqueting room of the Pavilion.

3 p.m., visit to Gas Company's works at Portslade and Corporation electricity power station at Southwick adjoining.

7.30 to 9.30 p.m., Institution dinner at the Pavilion.

Wednesday, Sept. 14.—10 a.m., papers descriptive of the "Public Lighting Scheme of Brighton," by Mr. John Christie, M.I.E.E., Engineer and Manager, Electricity Department, County Borough of Brighton; and "Road Traffic and Public Lighting," by Mr. R. L. Matthews, Chief Constable of Leeds.

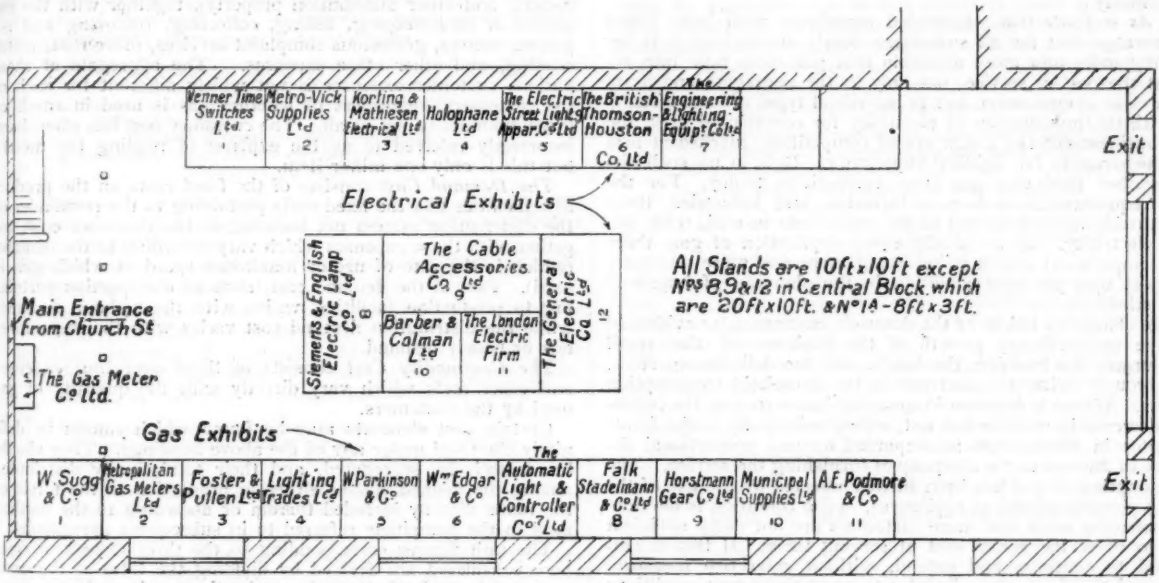
2 to 5 p.m., inspection of lighting appliances. Exhibition closes.

Thursday, Sept. 15.—Trips suggested.

EXHIBITION OF LIGHTING APPLIANCES.

All meetings of the Institution will be held in the Music (or Banqueting) Room in the Royal Pavilion. The Exhibition of the Public Lighting Appliances will be open daily from Monday, Sept. 12, at 8 p.m., until Wednesday, Sept. 14, at 5 p.m. The accompanying plan, giving the names of the exhibitors, shows the positions of their respective stands.

Any further information may be obtained from Mr. W. J. Liberty, Hon. Secretary, General Buildings, Aldwych, London, W.C. 2.


Venner Time Switches Ltd 1
Metro-Vick Supplies Ltd 2
Korting & Mathiesen Electrical Ltd 3
Holophane Ltd 4
The Electric Street Lights & Appar. Co Ltd 5
The British Thomson-Houston Co. Ltd 6
Engineering & Lighting Equipt Co Ltd 7
Exit
Electrical Exhibits
Siemens & English Electric Lamp Co. Ltd 8
The Cable Accessories Co. Ltd 9
Barber & Colman Ltd 10
The London Electric Firm 11
The General Electric Co Ltd 12
All Stands are 10ft x 10ft except Nos 8, 9 & 12 in Central Block which are 20ft x 10ft. & N° 18 - 8ft x 3ft.
Main Entrance from Church St
The Gas Meter Co Ltd.
Gas Exhibits
W. Sugg & Co 1
Metropolitan Gas Meters Ltd 2
Foster & Pullen Ltd 3
Lighting Trades Ltd 4
W. Parkinson & Co 5
Wm Edgar & Co 6
The Automatic Light & Controller Co Ltd 7
Falk Stadelmann & Co Ltd 8
Horstmann Gear Co Ltd 9
Municipal Supplies Ltd 10
A.E. Podmore & Co 11
Exit

SAFETY IN MINES RESEARCH BOARD.

The fifth annual report of the Safety in Mines Research Board, for the year 1926, has just been published by H.M. Stationery Office, price 9d. net. The year 1926 marked the virtual completion of the new research station for large-scale experiments at Buxton, and the commencement of the building of the Board's new laboratories at Sheffield. The Board's annual expenditure (chiefly derived from the Miners' Welfare Fund) remained at about £50,000.

As in previous years, the report is mainly devoted to brief accounts of the progress of the numerous researches which are being carried out either directly under the Board or Committees of the Board or at universities and other centres with the aid of funds supplied by the Board. The subjects of research included problems relating to coal dust explosions, fire-damp explosions, spontaneous combustion of coal (including the treatment of gob-fires), the safe use of electricity in coal mines, mining explosives, safety lamps, devices for trapping dust generated by rock drills, devices for winning coal without explosives, falls of ground, wire ropes, and the control of mine temperatures. New researches were begun under several of these heads. Thirteen reports were published by the Board during the year; and a list is given of many other papers relating to the researches written by members of the staff and published in scientific journals, &c.

The report also embodies an account of the progress of the health inquiries carried out under the supervision of the Health Advisory Committee—notably the inquiries with regard to the injurious effects of certain rock dusts.

"Gas Salesmen's Day, 1927."—The Annual Meeting of Gas Salesmen will be held in London on Friday, Sept. 16. The programme and arrangements for the meeting are nearing completion, and full details will be published as soon as possible.

IRISH ASSOCIATION OF GAS MANAGERS.

On Tuesday of next week, Aug. 16, the Irish Association of Gas Managers will hold their annual meeting in the Central Hall, Academy Street, Cork, under the Presidency of Mr. Joseph McNicholl, M.I.Chem.E., Engineer and Manager of the Cork Gas Consumers' Company.

In addition to the Address, two papers will be submitted—"Concrete Roads," by Mr. W. Millar, of Cookstown; and "Some Notes on Sulphate of Ammonia and the Manufacture of Liquid Household Ammonia as an Adjunct to a Sulphate of Ammonia Plant," by Mr. G. Walmsley, of Londonderry. In the afternoon there is to be a meeting of the Irish District Executive Board of the National Gas Council, over which Mr. M. J. Grey, A.C.A., Secretary of the Alliance and Dublin Gas Consumers' Company, will preside. Mr. E. J. Fottrell and Mr. W. M. Mason will deal with the work of their respective organizations. The members of the Association and their lady friends are promised a hearty welcome by the Directors of the Cork Gas Consumers' Company, whose guests they will be both at lunch and dinner in the Victoria Hotel.

On the morning of the following day (Wednesday) members and friends are to inspect the Ford Motor Works; while the afternoon is to be devoted to an excursion to Blarney Castle.

"A Standardized System of Gas Cooker Construction."—This is the title of an illustrated booklet published by Messrs. R. & A. Main, Ltd., of London and Falkirk. The object of the publication is to bring before those interested the salient points in design and construction of the "Maintenance" and "Mainstay" cookers and the "Conservor" oven. The "Mainstat" automatic heat regulator is also described and illustrated. The booklet is both well written and well printed.

BETTER FORMS OF RATES FOR GAS.

A DISCUSSION OF RATE-MAKING BASED ON ALLOCATED COSTS.

Approved and Adopted by the Executive Board of the American Gas Association.

In an "Editorial Note" in the "JOURNAL" for July 13 last, it was stated that the Committee of the American Gas Association appointed to consider Rate Fundamentals had, with the assistance of Mr. C. S. Reed (Rate Consultant), prepared a manual on "Better Forms of Rates for Gas." We have since received from the Association, through the Secretary of the Committee, Mr. A. Gordon King (who is the Association's Service Engineer), a copy of the Manual; and as the subject is one to which much study has been given in America, and also one in which the gas industry here is closely interested, we purpose to reproduce the contents as a series of articles in this and two subsequent issues of the "JOURNAL." The Committee on Rate Fundamentals of the American Gas Association was an influential one, under the Chairmanship of Mr. William L. Ransom.

WHY IS IT BECOMING MORE AND MORE DESIRABLE FOR THE GAS INDUSTRY TO ELIMINATE STRAIGHT METER OR UNIFORM RATES PER UNIT?

For the benefit of customer, community, and company, who are alike interested in seeing that the best possible service is rendered at the lowest price consistent with that service. Some of the following reasons may seem at first to be in favour of the company, but a closer examination will show that each will operate ultimately to the benefit of the customer as well as the community:

1. *As a Protection.*—Extended experience with rates based on average cost for all customers clearly shows that it is becoming more and more desirable that gas rates take into account the cost of service, not only in the aggregate and as to each class of customers, but to individual types of customers.

With the introduction of electricity for commercial uses, the gas business entered a new era of competition, marked at first by the struggle for lighting supremacy. It is in no such circumscribed field that gas faces competition to-day. For the fuel requirements of homes, factories, and industries, there are already aggressive and eager contestants in coal, coke, oil, and electricity. In practically every application of gas, there are competitors; and it is becoming more and more necessary to meet that practical condition in the planning of improved rate schedules.

The change of habits of the domestic customers, as evidenced by the extraordinary growth of the business of the small restaurant, the laundry, the baker, and the delicatessen store, has brought with it a decrease in the household consumption of gas. Where a decrease in quantity has occurred, the resulting decrease in revenue has not, owing principally to the forms of rates in effect, been accompanied by any proportional decrease in the cost to the company of furnishing the service. The consumption of gas has been further affected by the use of the many portable electrical appliances, and a condition is developing whereby more and more customers are not using sufficient gas to cover the actual cost of serving them. If this is permitted to continue and extend, without corrective measures designed to adapt rate schedules to meet these new conditions and to encourage new uses which increase consumption and improve the ratio between capacity and average daily output, it will be necessary to raise rates to all customers.

2. *As a Correction.*—Many companies serve from 30 to 80 p.ct. of their customers at a loss, which loss, if the company is to receive a fair return, must be made up by additional charges to the remaining customers; and the resulting rates are often too high to meet competition.

3. *As an Inducement.*—The industry desires that rates be such as to induce additional use of its service by each customer, through his knowledge that he can afford to use additional gas at relatively low additional cost.

4. *As an Economy.*—The industry desires to keep gas moving at all times through the mains at as nearly as possible the maximum rate of flow—that is, at the highest possible load factor—and thus utilize its entire investment, to the maximum extent, in the interest of distributing the fixed and stand-by cost over the largest practicable output, both per customer and in total. Economy in cost results from keeping plant, distributing systems, and labour uniformly occupied. Thus a large, steady use by the customer results both in gain to the company and lower unit cost to the customer.

In situations involving long-distance transmission of natural gas, a favourable load factor is of extreme importance, because the amount of the required investment in transmission facilities over the entire distance is determined by the maximum rate of flow.

5. *As an Attraction to Additional Industrial Gas Business.*—In industrial processes gas is used through the working hours of the day and throughout the year at a higher load factor than in domestic use, in which latter class there may be a seasonal peak load. Stimulation of large sales and greater use by the industrial customer are in the interest of domestic and commercial customer, because increased volume of sales tends to lower certain costs and thereby permit more favourable rates.

UPON WHAT COST ELEMENTS SHOULD RATE STRUCTURES BE BASED?

The expenses and fixed costs of operating a gas company fall generally into three classes. The total for one of these classes varies in proportion to the number of customers connected on the mains of the company, and is called the customer cost. The total of the second class of expenses and fixed costs varies in proportion to the maximum speed at which gas is used, and is called the demand cost. The remaining class consists of those expenses and costs which vary according to the total amount of gas made, produced, or purchased, and constitutes the commodity cost.

The Customer Cost consists of the fixed costs (*i.e.*, the return, retirement expense, and taxes on a large part of the mains, meters, and other distribution property), together with the expenses of book-keeping, billing, collecting, removing and repairing meters, gratuitous complaint services, office rent, meter reading, and other office expenses. The aggregate of these various customer expenses is not widely different for each of the customers, regardless of whether gas is used in small or large amounts or not at all. The customer cost has often been incorrectly referred to as the expense of reading the meter; but this is only one minor item.

The Demand Cost consists of the fixed costs on the production facilities and the fixed costs pertaining to the remainder of the distribution system not included in the customer cost, together with those expenses which vary according to the demand (which is the rate of use or maximum speed at which gas is used). Part of the demand cost, such as that portion pertaining to production facilities, varies with the 24-hour demand, while the distribution demand cost varies with the instantaneous or hourly demand.

The Commodity Cost consists of those operating expenses and other costs which vary directly with the quantity of gas used by the customers.

Certain cost elements may be found which cannot be definitely classified under any of the above headings. They should be tentatively segregated, and their total finally distributed among the defined classes either in proportion to the totals of the items directly included therein or according to the method used in the pamphlets referred to in subsequent paragraphs.

The unit figures corresponding to the three classes of costs here considered are derived by dividing the total of the costs assigned to each of these classes by the number of customers, the maximum demand on the system (see note), and the total quantity of gas sold, respectively.

In the "Principles of Rate-Making for Gas Companies," published by the American Gas Association in 1926, there is contained a detailed allocation of the expenses of a gas company into the three classes. In the 1926 Report of the Committee of Statistics and Cost Accounting, also published by the Association, there are two other analyses prepared along similar lines. A comparison of these three shows the following:

—	Company.		
	A.	B.	C.
Customer cost per year, per meter .	$13.12	$17.18	$13.22
Demand cost per year—			
Production, per 100 c.ft. of maximum daily demand	3.42	3.43	3.51
Distribution, per 100 c.ft. of maximum hourly demand . .	45.88	48.03	53.05
Commodity cost per 100 c.ft. sold .	.039	.030	.039

NOTE.—**There is a difference of opinion among analysts of gas service costs as to the composition of the maximum demand to be used as a divisor in determining unit demand costs. One group uses the actual maximum demand of the system. Another group has adopted the practice, often followed in electric rate design, of using the summation of customer's demands whenever occurring. Others identified with gas rate-making advise a reasonable combination of these two methods. The actual maximum demand of the system is here used illustratively. Any of the three methods will yield rate structures which recognize the cost allocation principles outlined.**

TO WHAT EXTENT ARE THESE COST ALLOCATION PRINCIPLES EXPRESSED IN ACTUAL RATE-MAKING PRACTICE?

In the practical development of rate structures, the amounts of the various charges established therein are usually varied from the computed unit costs, in order to conform to other considerations, such as value of service, competitive conditions,

and local preferences or predilections of view as to the form of rate, &c. The diversity of the demands of the customers, due to their using gas at different times of the day and on different days from each other, may also be given consideration.

The gas business is a great American industry, carried on in a multitude of communities in all parts of the country, under radically divergent local conditions. Forms of rates have almost always an historical background. What is altogether acceptable to one community may arouse irritation and provoke complaint in another. With all of these local conditions, wise company management will deal tactfully and will introduce the necessary adaptations of rate structures to minister to the local point of view as well as the local needs and conditions. There is no disposition on the part of this Committee to urge uniformity or the complete standardization of rate structures throughout the country. The purpose rather is to outline principles and expedients which may prove a useful guide in the development of better forms of rates, leaving to the directorate and management of each company (subject to regulatory consideration in proper cases) the determination as to the form in which, and the extent to which, these equitable principles shall be carried forward at any particular time.

The three-cost principles may be expressed as an out-and-out three-part rate; but many companies prefer to simplify the form by combining two or more of the charges. The actual form of the three-part rate, as generally used, is as follows, the figures being given merely as examples:

1. *Customer charge* per meter, per year . . . . (Payable in equal monthly instalments.)	$12.00
2. *Demand charge* per 100 c.ft. of maximum hourly demand per year . . . . . (Payable in equal monthly instalments.)	30.00
3. *Commodity charge* per 100 c.ft. gas sold . . . (or .60 cents per thousand.)	.06

In this form of three-part rate, the 24-hour demand cost is absorbed in the hourly demand charge or in the commodity charge—usually the latter.

There are many ways of modifying the above form, of which the following are examples:

(*a*) The use of some other term for demand charge, such as reservation charge, capacity charge, or fixed charge.

(*b*) The grouping of customer and demand charges into one amount, resulting in a customer charge, capacity charge, or community charge, somewhat as follows:

1. *Capacity charge* for the first 40 c.ft. or less of maximum hourly demand per year. . . .	$24.00
For all additional maximum hourly demand per year per c.ft. . . . . (Payable in equal monthly instalments.)	.30
2. *Commodity charge* for all gas sold per 100 c.ft. . .	.06

(*c*) The inclusion of the customer charge as part of the charge for the first few hundred cubic feet of gas, either with a separate demand charge, or with the demand charge also included, as per the following:

For customers with demands of 40 c.ft. per hour or less:

For the first 100 c.ft. or less of gas used each month	$2.06
For each additional 100 c.ft.	.06

For customers with demands of over 40 c.ft. per hour, the charge of $2.06 for the first 100 c.ft. or less used each month will be increased at the rate of $25 for each 10 c.ft. of additional hourly demand.

(*d*) Both the demand and commodity charges may take the block form, setting-up different amounts for succeeding blocks of demand or consumption.

(*e*) The demand charge may be expressed on a daily rather than an hourly basis, or with a combination of the two methods.

For comparatively small and stable service the hourly demand only may be used. For large industrial service, both hourly and 24-hour demand charges may be appropriate.

(*f*) The demand and customer charges may be spread over a six or eight months' period for seasonal business, such as house heating.

In dealing with residence service, the customer cost is of primary importance, and some companies consider it advisable to submerge the demand element as regards this class of business by including it as part of the commodity or customer charge. The rate in such cases consists of a fixed charge which is alike for all customers. It is either stated outright, or included with the first few hundred cubic feet of gas in the form given previously under paragraph (*c*). The following rate is an example of this type, but with the commodity charge in blocks:

For the first 400 c.ft. or less of gas used each month	$ .60
For the next 9600 c.ft. per 1000 c.ft.	.95
For the next 40,000 c.ft. per 1000 c.ft.	.90
For all over 50,000 c.ft. per 1000 c.ft.	.85

Attention is called to the fact that the fixed cost contained in the above rate amounts to only 22 cents per month, except for the small percentage of the customers who use less than 400 c.ft. per month. The above rate is in effect in the City of Chicago, and illustrates the practicability of installing such a type of rate in a large city.

On the other hand, in considering the large industrial business, the customer costs become relatively small and are sometimes omitted or included in the commodity charge, the rate containing only a demand charge in addition to the commodity charge, either expressed directly as such or included in the charge for the first few hundred cubic feet. For instance, in the latter case, the rate of paragraph (*c*) would become:

For customers with demands of 40 c.ft. per hour or less—	
For the first 100 c.ft. or less of gas used each month	$1.06
For each additional 100 c.ft.	.06

For customers with demands of over 40 c.ft. per hour, the charge of $1.06 for the first 100 c.ft. or less used each month will be increased at the rate of $.25 for each additional 10 c.ft. of hourly demand.

This type of rate may also be expressed on a daily, rather than an hourly, basis, or with a combination of the two methods. It may also be spread over a six or eight months' season for special business.

There are doubtless many gas companies now using straight meter rates which are convinced that ultimately a composite rate including at least demand and commodity charges should be established, but which find an immediate complete change to such a rate impracticable. In such cases an intermediate step, in some such form as described in paragraph (*c*) above, may offer suitable progress toward the ultimate goal.

HOW IS THE DEMAND DETERMINED?

In some cases by the actual continuous measuring of the speed at which gas is used, on either an hourly or a daily basis, and the selection of the maximum speed. In other cases, the demand is limited to the amount contracted for by the customer by means of a device which restricts the flow of gas to any desired maximum speed in cubic feet per minute. The demand may also be estimated from the rated capacity of the customer's appliances and a consideration of their possible use. It also may be based on the maximum possible flow obtainable with the appliances connected.

Another method is to make periodic or intermittent tests of the various installations and measure the maximum speed at which gas is being used.

Another method, for some classes of gas service, is to assume the demand according to the floor area, number of rooms, radiation surface, or size of meter required. In other cases, the demand is assumed as alike for all the domestic customers; different rates being used for other classes of business. The combination customer and demand charges then become a single fixed charge for most of the customers.

(To be continued.)

Selection and Placing of Employees.

In assisting eligible applicants for employment to decide what particular branch of the work will best suit them, the Consolidated Gas, Electric Light, and Power Company of Baltimore have found series of photographs depicting the various operating occupations to be of great value. The photographs are mounted on display boards so as to be easily seen. The method followed in utilizing them is as follows: First, the applicant's general qualifications for employment are ascertained by an interviewer. Then he is directed to the board displaying a group of photographs titled "apprenticeship." On this board are shown twelve occupations for which the Company frequently employ young men who are interested in learning a trade. The interviewer points out to the applicant the pictures of certain occupations for which he feels the applicant is fitted by education and general physical qualifications. Assuming that an applicant, after looking-over the designated photographs, selects the picture showing the work of a gasfitter's apprentice as the type of employment most interesting and congenial to him, he is then directed to the board on which the gasfitter's apprentice's duties are pictured in more detail. On this board is a "promotional chart," showing the classifications through which the apprentice must go before being qualified as a first-grade fitter; and there are photographs of some of the various duties and classroom work of an apprentice while under instruction. Mr. George D. Penniman, Jun., who describes the plan in the pages of the "American Gas Association Monthly," says the heads of Departments find that much time is saved for them, and that they can have a much more satisfactory interview with an applicant who has already seen the picture story of the job under discussion. In fact, the expense incurred in the preparation of the photographs has been amply justified by the results achieved.

FACTORIES AND WORKSHOPS REPORT FOR 1926.

The effect of the disturbed industrial conditions by which the year 1926 was marked is, of course, emphasized in the annual report of Mr. Gerald Bellhouse (the Chief Inspector of Factories and Workshops) covering that period, which has lately been issued by H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, and Branches, at the price of 2s. 6d. net.

Inspectors in all parts of the country, he says, comment upon the disastrous results of the coal stoppage, particularly in those industries where fuel plays an important part. However, as we know, there was a brighter side, inasmuch as a great many industries were able to carry on and employ most of their workers throughout the entire period of the coal strike. This, as is mentioned in the report, was largely due to gas and electricity undertakings being able to meet the demands of consumers. Foreign coal mainly allowed of this being done; but a great deal of outcrop was utilized in certain districts, and in South Wales it is estimated that over 100,000 tons of coal dust (which had been carried down by the streams from the coal washeries farther up the valleys and deposited at bends in the rivers) were recovered and used as fuel.

It appears that, notwithstanding the trade difficulties of the year, there has been further industrial development in the outer suburbs of London and in the Home Counties. This is indicated by the number of persons insured under the Unemployment Insurance Acts; and it is also reflected in the number of accidents reported to the inspectors. The total number of registered factories rose slightly, from 144,361 in 1925 to 145,411; while registered workshops declined from 128,793 to 121,861. The Department suffered a serious loss during the year through the retirement of Sir Thomas Legge, the Senior Medical Inspector, who rendered great service in the study of industrial disease and in minimizing its effects.

The pamphlets and publications issued included a memorandum prepared by the Association of British Chemical Manufacturers and the Association of Tar Distillers, in consultation with the Chief Inspector, dealing with the preparation and testing of tar, benzole, and oil stills and closed tanks. There was also a leaflet on the subject of lighting in factories and workshops. Among the additional publications of the Industrial Fatigue Research Board were a contribution to the study of the human factor in the causation of accidents; a physiological study of the ventilation and heating in certain factories; and a report upon the relation between illumination and efficiency in type-setting by hand, a notice of which appeared in the "JOURNAL" for June 29 last, p. 988.

ACCIDENTS.

In the course of 1926 there were reported 139,963 accidents, including 806 which were fatal. These figures, which were, of course, influenced by the prolonged coal stoppage, represent a substantial decrease when compared with 1925. There was an increase in the number of accidents in gas-works; and fatalities in electric generating stations rose in number from 15 to 20. Progress in the establishment of "safety" organizations has been disappointingly slow; but there are in the present report encouraging signs of growing interest in the matter. As usual, a number of serious accidents were due to shafting; and in order to enlighten the general industrial population in this important matter, the staff of the Department have for some time past systematically instructed responsible persons as to the dangerous practice of shipping and unshipping belts and oiling shafting while the gearing is running at normal speed. In the light of decisions quoted, it must, the report states, be regarded as settled Law that the occupier of a factory is under an obligation to fence all shafting which it is possible for anyone to approach, unless he takes adequate steps to prevent any person being endangered by it. Where the occupier decides to rely on the latter alternative, the responsibility for the steps taken must rest upon him. Already, as the result of the High Court decisions, a stimulus has been given to the evolution of appliances for the safe mounting of belts, and means of lubricating which render it unnecessary for the worker to come in close proximity to the gearing at all. Six fatal accidents due to explosions of acetylene were referred to the Engineering Branch.

LIGHTING.

A great deal of systematic attention has been given by the staff to adequate lighting, both natural and artificial; and most manufacturers now realize that, if output and good workmanship are to be maintained, lighting must be sufficient in amount and suitable for the particular task in hand. One inspector mentions that much good work has been done in Coventry, where experiments have been carried out with two different systems—individual lamps for each machine; and powerful lamps, suitably shaded, fixed high up. The latter system is generally preferred in large, open shops, if there is not too much overhead gearing; but many managers prefer the separate light for each machine. The use of bench coverings which are of such a colour and texture as to prevent reflection of bright light into the eyes of the workers has now become established in factories in which small electrical work is carried on; and the provision of shades of suitable design and colour has become much more common. In one works where safes are made, in view of the fine work to be done on the locks, a bench-level illumination of 10 foot-candles is aimed at. "Artificial daylight" is being more widely used in colour mixing and matching rooms. Instances are quoted to illustrate the evil effects of glare.

From Scotland comes the remark that the lighting of foundries requires special consideration, in view of the fact that the maximum illumination is required at the floor level, and, further, on account of the black floors, there is a maximum amount of light absorption and no reflection from other sources. Several occupiers have recognized this, and have installed systems of properly spaced lamps, which give maximum reflection and proper concentration of light at the floor level. As an instance of the advantage to be obtained from a good system of lighting, there is quoted the case of a large firm of rubber manufacturers who, by re-arrangement of their lighting system in several departments, have increased their output by amounts varying from 7 to 16 p.ct.

The suggestion that a collection, for various industries, of a sufficient number of observations should be made to give some indication as to the best practice regarding lighting, has again been followed. The observations were taken principally in the cotton trade in Lancashire, and in the metal industries in the Birmingham area.

HOURS OF WORK.

Reports from all parts of the country show that there has been no change in the general basic week, which remains at not more than 48 hours. The five-day week, which in some places is gaining in popularity, fits in more or less with a 48-hour week; while the disinclination to begin work before 8 a.m. has also tended to reduce the number of hours worked. Generally speaking, too, the state of trade during the year has removed any incentive to work longer than 48 hours, though in some instances it is reported to have had the opposite effect.

EDUCATION IN INDUSTRY.

Interesting examples from the various divisions of educational facilities of all kinds show that education in industry is gradually coming to be regarded as of the first importance. Undoubtedly, the number of factories in which some educational training is given is steadily increasing.

LABOUR-SAVING APPLIANCES.

In a section dealing with labour-saving appliances, Mr. W. F. Findlay refers to the growing use of conveyors and elevators, and points to some interesting examples in this direction. Advancement has been made in the pneumatic conveying of goods, in which case the conveyor, "being only a pipe," can easily be carried over roads, rivers, railways, and other obstacles insurmountable to ordinary methods of transport. One of the latest methods of conveying is known as the induction system, and is neither a suction nor a pressure method, but a combination of both. At a convenient position in the pipeline, a jet of air at high pressure is blown into the pipe. This causes a flow of air in the pipe, which carries the material to be moved along with it.

In one instance, for transporting coal from railway sidings to boilers, the coal is discharged from trucks into large bunkers. These bunkers are connected by wide ducts to a large central pipe; and the action of a powerful exhaust fan sucks the coal a distance of 200 yards to a central stokehold. There the coal drops on to a band conveyor, and is carried over the boiler bunkers; being discharged into each bunker as required by a movable device mounted on the band conveyor.

The use of stoking machinery in gas-works is noted.

DEVICE FOR SUPPORTING SOLDERING IRONS.

A simple and ingenious device seen in a tinware works might, it is remarked, with advantage be adopted elsewhere. The soldering irons are supported by means of coiled springs from a wall at the back of the soldering bench; one end of each spring being attached to a wooden plug let into the wall, and the other end to the soldering iron. The attachment of the spring to the soldering iron is so arranged that when left alone the iron rests at an angle of 45° just clear of the bench—a most convenient position for instant use. After use, when the handle is released, the iron swings back to its original position. This arrangement obviates much lifting and putting-down of the iron during the course of a day's work.

SENIOR MEDICAL INSPECTOR'S REPORT.

Dr. John C. Bridge states that during the year 187 cases of epitheliomatous ulceration were reported, of which 49 were

fatal. Of the total number of attacks, 49 were due to pitch and 27 to tar. Of these, 15 were in connection with gas-works. The 49 deaths did not all occur among persons who contracted the disease during the year, as the disease is a slowly progressive one, and several years may elapse between the onset and the fatal termination. Indeed, the slow progress of this disease, he says, fortunately offers an opportunity of minimizing the mortality by early treatment; and to this end periodical medical examination is of the greatest importance.

Of cases of "gassing," 32 occurred in connection with producer gas; while of 26 occurrences (with one death) reported as arising from coal gas, eleven occurred in gas-works. Of these, attending, repairing, or cleaning accounted for six; leaky joints in pipes or gas jets, for fourteen; emptying purifying boxes, for four; and inhalation of coal gas through the mouthpiece of a blowpipe, for one. The cause of the fatal case was somewhat obscure, but was probably due to the escape of coal gas from an india-rubber pipe which was temporarily led into a boiler for lighting purposes, while the deceased was removing copper coils from the bottom of the boiler.

A man engaged in re-filling a tank containing ammoniacal liquor put his head inside the tank, and was overcome. He was wearing a respirator made only of cotton wool, with metal frame, though a proper breathing apparatus was available.

There continue to be, unfortunately, cases of minor injury which terminate fatally. In all such instances, it is pointed out, there appears to be a failure to seek first-aid treatment immediately the accident occurs.

ELECTROSTATIC PRECIPITATION OF TAR.

IN the "JOURNAL" for June 8 last, p. 626, we published extracts from a paper by Mr H. M. Pier, of Chicago, on the Cottrell precipitation process, as applied to the separation of tar fog and entrained moisture from gas. At the Annual French Gas Congress, M Stoss dealt very fully with the theory and practice of the system, and gave results of tests carried out at the Marseilles Gas-Works. The following are extracts translated from his paper.

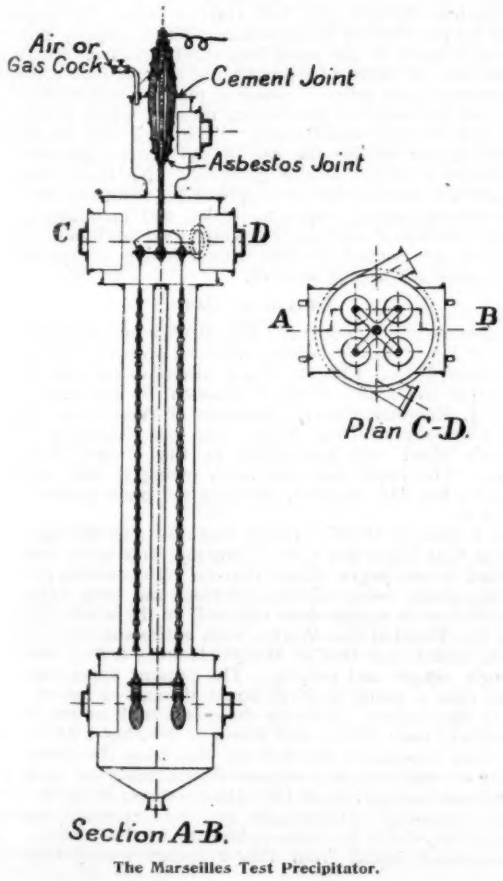
HIGH-TENSION D.C. REQUIRED.

The electric current upon which the precipitation depends must be high-tension direct or uni-directional, as alternating current lowers the duty of the plant. A normal pressure to employ is 55,000 to 70,000 volts, though in America it attains a figure as high as 100,000 volts. In actual practice, however, there is no machine capable of directly supplying current at such a pressure; and recourse must be had to rectifying a high-tension alternating current provided through the medium of an appropriate transformer. In certain cases the first step of all will have to be the commuting of ordinary D.C. into low-tension A.C. for the transformer.

[A section of the paper is then devoted to a detailed description of the various electric apparatus recommended, and of the known types of precipitator. A general indication of the design of the best type was given in our previous article (*loc. cit.*); and the test plant at Marseilles is modelled on this.]

THE MARSEILLES TEST PLANT.

The four vertical tubes are 2·6 m. [8½ ft.] long and 0·188 m. [7½ in.] internal diameter; and they and the shell of the plant are of sheet steel. The electrodes themselves are cylindrical brass elements strung together on steel wires. The latter are suspended from a header in the form of a cross; and this in turn is held by the high-tension insulator. The insulator itself is half in the air and half in an upper compartment of the precipitator, and is jointed as indicated in the drawing; and arrangements are made for the admission of a small quantity of air or clean gas to this compartment, in view of the apparatus working under a vacuum. Manholes are provided, as shown.



The Marseilles Test Precipitator.

The test precipitator was placed in the gas stream between a set of condensers and the exhausters; and the supply of current was three-phase, 190 volts, 25 period, passed to a rectifier by a 220-50,000 volt transformer. A variable resistance was arranged on the low-tension circuit.

The tests were carried out on coal gas from either Bueb verticals or ordinary horizontal retorts; and the gas was more or less cooled, before the precipitator, in the condensers at the outlet of the retort-house, by which the tar content could be varied. A carefully calibrated "Integra" meter was used to measure the volume passed.

The quantities of tar and entrained moisture in the gas before and after precipitation were arrived at by passing a measured quantity through filter tubes packed with glass wool and asbestos, which were inserted in the centre of the gas stream. The filter tubes led on to a jar of iron oxide, and thence to test meters and manometers. The gas filtered in this way amounted to 60 to 90 litres per hour throughout a test; and on completion of the latter, the filter tubes were weighed, dried, and weighed again for the determination of the tar fog and entrained water contents.

Gas temperatures were taken by thermometers on the inlet and outlet pipes of the precipitator; the bulbs being carefully centralized in the stream. It was deemed useless to register the total power absorbed by the plant. Only a relative result would have been obtained, as the capacity of the transforming and rectifying plant was greatly in excess of actual requirement.

TEST RESULTS.

[The author includes two pages of figures which tabulate all the readings of fourteen tests; but the statistics below, which relate to the best efficiency obtained, will give our readers sufficient indication of the results.]

10-Hours of Gas from Bueb Verticals.

Av. temp. of gas, inlet	20·3° C.
,, ,, ,, ,, outlet	22·3° C.
Gas treated, av. per hour	230 cub.m. [8122 c.ft.]
Velocity of gas in tubes	0·62 m. per sec. [2 ft. per sec.]
Tar content, inlet	706 gms. per 100 cub.m. [308 grs. per 100 c.ft.]
,, ,, outlet	27 gms. per 100 cub.m. [11·8 grs. per 100 c.ft.]
Efficiency of tar removal	96 p.ct.
Water content, inlet	860 gms. per 100 cub.m. [376 grs. per 100 c.ft.]
,, ,, outlet	31 gms. per 100 cub.m. [13·5 grs. per 100 c.ft.]
Efficiency of water removal	96 p.ct.
Volume of air admitted, av. hourly	89 litres [3·1 c.ft.]
,, ,, ,, ,, p.ct. on gas	0·038
Max. calc. tension of current	54,000 volts
Potential gradient	5.745 volts per cm.
Intensity of rectified current	9·3 milliamps.

The following comments may be made upon the results as a whole:

1.—The average tar content in the purified gas is very low—in the neighbourhood of 36 grammes per 100 cub.m. [15·7 grains per 100 c.ft.]. In one test, as a matter of fact, it amounted to nearly twice that much; but the content at the inlet had been purposely raised as high as 1241 grammes per cub.m. [542 grains per 100 c.ft.].
2.—The efficiency of the precipitator is substantially constant, and always above 90 p.ct.
3.—This efficiency is substantially independent of the quantity of gas treated.
4.—It rises with an increase in the tar content.

[These four observations apply equally to the water content.]

5.—The quantity of air introduced is exceedingly small in volume compared with the gas treated; and the former may conveniently be replaced by clean holder gas.
6.—The intensity of the rectified current remains substantially constant.
7.—The quantity of the coal gas appears to be unimpaired.
8.—The loss of pressure in the gas precipitator is negligible—never exceeding 0·5 mm. W.G.

Full-Scale Apparatus.

The makers of the Commercial plant, the Sté. de Purification Industrielle des Gaz, have supplied M. Stoss with the following information.

The number of tubes obviously depends upon the volume of gas to be treated; and the rate of flow of the gas must not exceed 1 m. [3·28 ft.] per sec. In order to keep the plant within reasonable dimensions, several precipitators may be grouped in a battery; one electric installation serving the whole. Each unit, however, should be capable of isolation.

Drawings are given of a plant of a capacity of 1800 cub.m. [63,600 c.ft.] per hour. The apparatus comprises 20 tubes, each 3 m. [nearly 10 ft.] long and 0·188 m. [7·4 in.] internal diameter, which provides for the treatment of 25 cub.m. [883 c.ft.] of gas per tube per second—a velocity of 0·9 m. [2·9 ft.] per second. There are four high-tension insulator compartmented in pairs; and the electrodes are of steel elements strung on wires. A similar precipitator, but containing only 12 tubes, would be capable of purifying 1000 cub.m. [35,300 c.ft.] per hour.

The rectified high-tension current should be at a voltage of 55,000 to 70,000; and the total motive power, A.C. or D.C., necessary for its production is given by the makers as 1 kw. for gas throughputs up 3500 cub.m. [123,600 c.ft.] per hour; 1·5 kw. up to 5000 cub.m. [176,600 c.ft.]; and 3 kw. up to 10,000 cub.m. [353,200 c.ft.] per hour.

Advantages for the Gas Industry.

Electrostatic precipitation of tar fog can be applied to all gases met with in our industry; but no plant yet exists in France, though they are numerous in America and Germany. Canada has them at Vancouver and Tacoma; and notable among those in the States are the installations at Denver, Washington, and Philadelphia. The latter has a capacity of 850,000 cub.m. [over 30 million c.ft.] per day; and it is intended to duplicate the plant. According to a paper before the American Gas Association in 1924, the total capacity of the Cottrell plants in the U.S. amounted to 7 million cub.m. [247 million c.ft.] per day. Germany treats per day as much as 1½ million cub.m. [53 million c.ft.] of producer gas, water gas, and coal gas.

M. Stoss considers that the process offers the following advantages to the gas industry:

1.—It is as efficacious as other mechanical processes, if not superior to them.
2.—There is practically no loss of pressure.
3.—Running and maintenance costs are greatly reduced.
4.—There is an improvement in the working of the other gas-works processes, due to the very small amount of tar remaining in suspension.

CANADIAN GAS ASSOCIATION.

Proceedings at the Toronto Convention.

(*Concluded from p.* 278.)

Gas Supply in New Jersey.

The Public Service Electric and Gas Company serve a population of 3 millions, occupying 1600 sq. miles of the most prosperous section of New Jersey, situated between New York and Philadelphia; and it was explained by Mr. Harry Ellis, in outlining the principal methods used to supply 700,000 gas consumers, that the requirements are met by two bye-product plants and ten carburetted water gas sets, of which four are in reserve to meet contingencies. There are 25 holder stations, and 4000 miles of street mains. The existing undertaking is the result of consolidation and the inter-connection of 30 independent plants within the past 40 years. The gas is distributed by three distinct methods—low pressure, intermediate pressure, and high pressure.

In order to prolong the adequacy of the transmission system and permit extensions thereto, 1,000,000 c.ft. waterless holders were constructed on the terminals of two arteries, the piston being weighted to deliver at a pressure of 20 in. (water). Gas is supplied to these holders automatically by a quick-closing gate valve actuated by the holder piston through the medium of a cable and counter-weights. A diaphragm governor prevents this during the peak. Conversely, a diaphragm governor controls the send out, being adjusted to assist the pumping main when the terminal pressure falls below 20 in.

Many of the large mains leaving the works were laid years ago with lead joints, which leaked when subjected to pressures in excess of those delivered by the holders; and after experiment a special split sleeve to envelop the bell was designed. These sleeves were made-up with neat cement in a manner similar to that employed on the installation of an ordinary split sleeve; their adoption being based upon the theory that the lead joint, when recaulked, would remain tight if maintained in a rigid position. Large mains having cement joints also leaked when subjected to similar pressures, whereupon 1½ in. of the joint was cut out, replaced with cast lead, and caulked, thereby constituting a composite cement-lead joint. All cast-iron pipe 8 in. and larger laid in recent years has bells 6 in. deep without the lead groove; the joints being of the foregoing composite type. Screw-end pipe is used for all high-pressure mains, excepting 12 in. or larger, which are welded. Fittings of all sizes are made of welded pipe.

The Company's territory, comprising 190 separate municipalities, is supplied by 507 miles of inter-connecting pumping mains; pressure-raising plant being located at various points. Generally speaking, an extra main is laid across all navigable streams; this being connected to the main stem on each side of the stream, so that continuity of supply is assured in the event of one line sustaining an injury. Extra heavy steel pipe is used for crossings involving 12 in. or smaller pipe; whereas in larger sizes a trench is dredged, piles driven and capped, and cast-iron flanged pipe laid thereon below the depth prescribed by the Federal Government. The Company now have concrete tunnels at the most important sub-river crossings.

There are 200 miles of wrought-iron or steel pipe utilized for high pressure; 600 miles of cast-iron pipe for intermediate pressure; and the balance, 3200 miles, most of which is cast iron, is for low-pressure distribution. The high and intermediate pressure mains involve the use of 596 district governors and approximately 16,000 service governors. No fewer than 1200 men and 321 automobiles are required for repairing, installing, and removing meters, repairing leaks, and installing and adjusting consumers' appliances; while 5000 additional seasonal employees are needed for the annual laying of 250 miles of street mains and 26,000 services.

Drying of Gas.

A paper on the subject of "The Drying and Further Purification of Town Gas"—dealing with the process of Messrs. W. C. Holmes & Co., Ltd., to which attention has already been directed in the pages of the "Journal"—was presented by Mr. F. J. Kennedy, General Manager of West's Gas Improvement Company of New York, who are handling Messrs. Holmes's plant and specialities in the United States and Canada. The paper was not read, owing to the lateness of the hour; but Mr. Kennedy outlined the main points touched upon in it.

Last February, Mr. C. Harris, Engineer and Manager of the Taunton Gas Light and Coke Company, in a letter which was published in our pages, stated that for eight months previously a drying plant, using calcium chloride, had been working (in conjunction with naphthalene removal) on the whole of the output of the Taunton Gas-Works, with entire success. The process, he added, was that of Messrs. Holmes & Co., which was extremely simple and reliable. The present paper states that in this case a pump delivers liquid through a set of coolers back to the washer. Actually there is a tank at the outlet of the washer, from which this pump is drawing. At the same time, from a point on the delivery pipe from the pump to the coolers, a small supply is tapped-off and run over an exposed set of pipes through which the exhaust steam from the driving engine is passing. This results in a loss of water vapour to balance that which has been taken up in the washer. The reconcentrated liquid from this evaporation apparatus falls

back into the tank from which the pump is sucking. This is the simplest arrangement which has been operated on the process. A more complex system of circulation involves a separate pump.

The scheme comprises a Holmes 1920 type rotary brush scrubber-washer, in two sections, each of six chambers, driven by a steam engine placed centrally between the sections. The arrangement will be seen in a diagram which accompanied the article by Mr. J. Parker on "The Purification of Town Gas in Relation to Corrosion," appearing in the "JOURNAL" for May 11 last (p. 362). The first six chambers are supplied with calcium chloride solution for gas drying, and the second six with gas oil for naphthalene washing in the usual way. Practically complete freedom from naphthalene is obtained using only about 14 gallons of gas oil per million c.ft. of gas passed. There is an evaporator for the concentration of the used and diluted calcium chloride solution; the exhaust steam from the washer engine being more than sufficient for this purpose. Two tanks for the calcium chloride solution are formed in the concrete of the washer foundations. As the absorption of water vapour is accompanied by a change of state from the gaseous to the liquid, it is, of course, accompanied by the evolution of heat, necessitating the cooling of the solution. This is done by compact coolers.

A calcium chloride solution of approximately 40 p.ct. strength is first formed by dissolving the solid calcium chloride in water in one of the concrete tanks; and this solution is pumped into the washer when cold, and a batch of solution of similar strength is made. From 1000 to 1500 gallons of this 40 p.ct. solution are pumped into the gas outlet chamber of the washer per hour for each million c.ft. of gas passed. The diluted calcium chloride solution (which is displaced) flows from the gas inlet chamber of the washer into the tank; and a small proportion is concentrated and made-up to its original strength by being circulated over the evaporator.

This plant was designed to operate on the gas immediately before entering the holder. To avoid the re-absorption of water in the holder by the gas coming into contact with the water in the tank, a layer of oil was provided on the surface. Subsequent tests have shown that the rise in dewpoint of the gas between the holder inlet and outlet amounts to between 2° and 3° Fahr., which still leaves the drying effect well within the required safety limit. Another type of plant has been designed to operate on the outlet of the holder.

It is stated that dry gas meters installed at the time when the plant at Taunton was first put into operation were in absolutely new condition six months later, whereas previously this period was quite sufficient to show noticeable signs of deterioration of the metal work. Samples of various grades of iron and steel in the laboratory exposed respectively to dry and saturated gas show an enormous difference in behaviour. On the dry gas no effect of any kind has been produced on any of the samples after periods varying up to 135 days; whereas with the moist gas 12 days was generally sufficient for the first visible effect of rusting to show, and in the period of 133 days the samples had become practically unrecognizable from one another. Syphon pumping on the Taunton district yields less than 3 p.ct. of the liquid which was picked-up in this way a year ago. The water now found in the pipes has been shown to be due to broken mains lying in water-logged soil. Since the introduction of the complete process for removal of moisture and naphthalene, stoppage complaints have practically disappeared.

Other advantages which may be expected from the use of gas in a dry state were enumerated by Mr. Parker in the article in the "JOURNAL" to which reference has already been made.

THE VARIATION OF THE HUTCHINSON CONSISTENCY OF TARS WITH TEMPERATURE.

By H. M. SPIERS, M.A., B.Sc., F.I.C.

[Reprinted from the "Journal of the Society of Chemical Industry," July 29, 1927, p. 329 T.]

H. Mallison and F. Soltau* have investigated the formula proposed by the author† for expressing the variation of the consistency of tars with temperature, and have sought to show that a formula of the type $\log C_1/C_2 = K(T_2 - T_1)$ is not applicable. They have quoted experimental data purporting to support their views; but examination of their figures shows that a linear relationship between temperature and the logarithm of the consistency does in fact apply over relatively large temperature intervals—indeed, over temperature ranges in which the consistency is increased by amounts varying from 200 to 900 p.ct.

For each of the samples of tar concerned, the temperature interval in which measurements were made may be divided into two parts, in both of which the logarithmic relationship holds good. This is evident from the following tables based on Tables II. and III. in Mallison and Soltau's paper.

Calculations from Table II.—Range of Observations, 9° to 27° C.

(A) For the range 9° to 19° C.

Formula: $\log C_T = \log 12{\cdot}4 + 0{\cdot}08466\,(19 - T)$.

Temp. T.	19 − T.	0·08466 × (19 − T).	Log 12·4 + 0·08466 × (19 − T).	Consistency. Calc. Sec.	Consistency. Obs. Sec.	Diff. P.Ct.
Deg.						
9	10	0·8466	1·9400	87·10	87·1	*Nil*
11	8	0·6773	1·7707	58·98	59·2	−0·4
15	4	0·3386	1·4320	27·04	27·2	−0·6
19	0	0·0000	1·0934	12·40	12·4	*Nil*

(B) For the range 19° to 27° C.

Formula: $\log C_T = \log 12{\cdot}4 + 0{\cdot}06420\,(19 - T)$.

Temp. T.	19 − T.	0·06420 × (19 − T).	Log 12·4 + 0·06420 × (19 − T).	Consistency. Calc. Sec.	Consistency. Obs. Sec.	Diff. P.Ct.
Deg.						
19	0	0·0000	1·0934	12·40	12·4	*Nil*
23	−4	−0·2568	0·8366	6·86	6·8	+0·9
25	−6	−0·3852	0·7082	5·11	5·0	+2·2
27	−8	−0·5136	0·5798	3·80	3·8	*Nil*

It must be pointed out that one observation recorded by Mallison and Soltau in Table III. in their paper has not been taken into account—namely, the value 55·0 seconds reported for the consistency at 27°—since it is clear that some error has arisen either in the measurement of the temperature or in the time of fall of the tar tester.

Calculations from Table III.—Range of Observations, 18° to 37° C.

(A) For the range 18° to 29° C.

Formula: $\log C_T = \log 30{\cdot}3 + 0{\cdot}0905\,(29 - T)$.

Temp. T.	29 − T.	0·0905 × (29 − T).	Log 30·3 + 0·0905 × (29 − T).	Consistency. Calc. Sec.	Consistency. Obs. Sec.	Diff. P.Ct.
Deg.						
18	11	0·9955	2·4769	299·8	303·2	−1·1
22	7	0·6335	2·1149	130·3	126·2	+3·3
25	4	0·3620	1·8434	69·7	71·0	−1·8
29	0	0·0000	1·4814	30·3	30·3	*Nil*

(B) For the range 29° to 37° C.

Formula: $\log C_T = \log 30{\cdot}3 + 0{\cdot}05805\,(29 - T)$.

Temp. T.	29 − T.	0·05805 × (29 − T).	Log 30·3 + 0·05805 × (29 − T).	Consistency. Calc. Sec.	Consistency. Obs. Sec.	Diff. P.Ct.
Deg.						
29	0	0·0000	1·4814	30·3	30·3	*Nil*
32	−3	−0·1742	1·3072	20·3	19·7	+3·0
35	−6	−0·3483	1·1331	13·6	14·0	−2·9
37	−8	0·4644	1·0170	10·4	10·4	*Nil*

It is evident from the foregoing calculations that in the case of each of the two tars the relationship proposed by the author holds good with decreasing temperature until a stage is reached at which some physical alteration occurs in the nature of the tar. At this point there is an abrupt change in the direction of the straight line, but a linear relationship still applies, though the value of the constant is changed. The physical alteration in the nature of the tar may be due to one or more of a variety of causes, such as crystallization of naphthalene, deposition of waxy material or changes in the state of aggregation of the dispersed colloids. The author has himself noted similar cases where the relationship between temperature and the logarithm of the consistency is shown by two, and sometimes even by three, straight lines over the range of temperatures covered by the observations made on the particular tar under examination. It was for this reason that the nomogram included in his paper was made to cover a difference of temperature of only 14° Fahr. (7·8° C.). This interval is large enough to satisfy the requirements of works tests

* Brennstoff-Chem., 1927, **8**, 169.
† J.S.C.I., 1926, **45**, 396T.

where the object of the determination is generally to enable faulty batches of tar to be corrected, or to make adjustments to the still. In such a case, even though there should happen to be a transition point between the two temperatures at which the tar is tested, the value calculated for the consistency at the standard temperature will be sufficiently close to the actual value to meet the end in view.

SUMMARY.

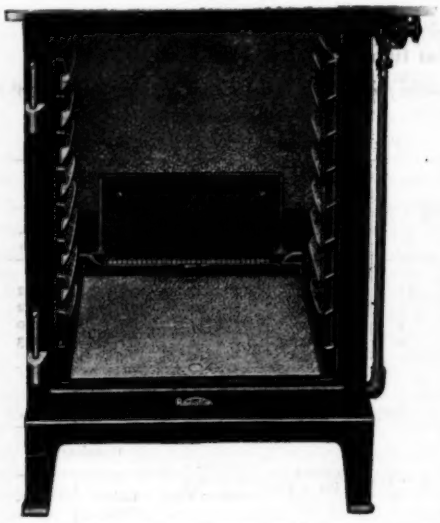
The relationship log $C_1/C_2 = K (T_2 - T_1)$ connecting the temperature and consistency of tar is true within the limits of experimental error over ranges of temperature as large as 10° C. (18° Fahr.). The value of K changes abruptly at certain temperatures, depending on the nature of the tar; and such changes probably indicate a sudden alteration in the physical properties of the tar.

In the report of the discussion at the Conference, in the "Journal of the Society of Chemical Industry," Dec. 17, 1926, it is noticed that "Mr. C. Chapman complimented Mr. Spiers on the work he had done, and said that at Glasgow they had already checked his nomograms by their own graphs of viscosities obtained empirically with a very close adherence in the results."

"NEW WORLD" COOKER IMPROVEMENTS.

The "New World" gas cooker, with its "Regulo" automatic heat control, direct bottom-flue outlet, and single burner in the oven, was introduced by Radiation Limited in 1923. It will be remembered that, when this series of cookers was brought out, it was claimed that the oven would show a saving of some 25 p.ct. in gas consumption as compared with gas ovens previously available, and that at the same time improved cooking results would be attained. Further, that with these new ovens automatic cooking could be effected, and that the "Regulo" would enable this to be done in a satisfactory manner. During the last four years the industry has had ample opportunity to test these cookers; and it is now recognized that the claims advanced by the makers in the first instance were justified. As a result, the "New World" cooker has attained an eminent position, in view of the means it incorporates of applying gas to the cooking of foodstuffs under domestic conditions.

Some short time ago, the makers placed on the market a series of cookers embodying the well-known "New World"

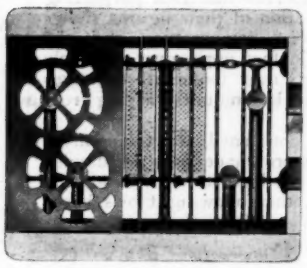


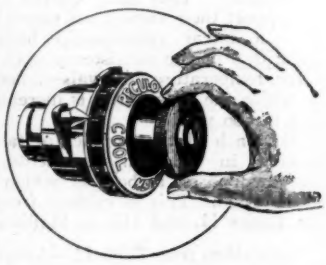
features of construction, together with certain modifications which experience had shown to be desirable. In the latest "New World" cookers, which are manufactured by the six Radiation firms, the working parts are standardized and interchangeable, as was the case with the original cookers; but the exterior designs have been made to vary in the individual patterns, as with their standard gas fires. Improvements of design have been made with the object of reducing labour and still further increasing the efficiency of the cooker. At the same time the range of temperatures controlled by the "Regulo" has been extended downwards, and an additional low-temperature cooking zone has been provided at the bottom of the oven.

The removal of the flue outlet from the top to the bottom of the cooking space resulted in the production of a steam-rich atmosphere, which enables better browning of meat or bread to be effected. The single-burner construction, the makers point out, permits of a larger cooking space being provided than when two burners are used in the oven. The minimum consumption which can be used without danger of extinction of the flames, owing to slamming of the door, is also lower than with two burners; and, as a consequence, not only the thermal efficiency, but the general efficacy, of the oven is improved by the adoption of the single-burner construction.

There are no loose gates in the oven; the shelves being carried on smooth projections embossed on the enamelled sides. An adequate number of shelf positions is provided to meet all requirements. The bottom of the oven is closed by an enamel plate which, in addition to keeping-out dust and adding greatly to the appearance of the interior, provides another cooking shelf. The extra space available in the lower part of the oven forms a cooler zone in which milk puddings and the like can be cooked, while roasting and other work for which higher temperatures are required are carried on above.

Two lower "Regulo" marks have now been introduced—namely, Marks ½ and ¼. This downward extension of the temperature range of the "Regulo" is of particular value when low-temperature cooking—such, for example, as stewing—has to be done. Stewing operations occupy a considerable time; and it is desirable that boiling shall not be permitted during the operation. By carrying out the work in the "New World" oven under "Regulo" control, ideal stewing can be effected with a certainty not possible when the heating is performed on the hotplate.





As further evidence of the possibilities offered by these "New World" ovens, a series of whole-dinner recipes has been prepared, each consisting of meat, vegetables, and sweets, so arranged that all can be put into the oven at one time, and later taken out together completely cooked—only one setting of the "Regulo" being employed, and no attention being necessary on the part of the user.

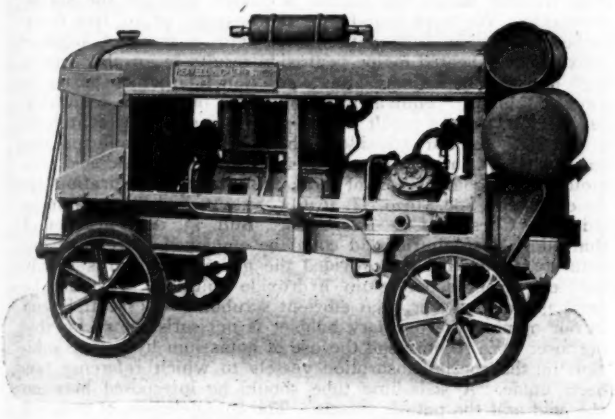
The hotplates of these new cookers are provided with an innovation intended to overcome the possible instability of very small pans when placed carelessly on high-efficiency bars. One-half of the cooker hotplate consists of a metal plate that is designed so as to avoid the disadvantages of the "all-solid" type of hotplate. This metal plate is known as the "Semisol," and provides a support giving all the stability that can be desired, even with small pans. The "Semisol" is, as stated, supplied to cover half the cooker hotplate; the other portion retaining the single bars which, while easy to clean, permit of the attainment of the maximum efficiency.

British Standard Specifications for Paints, &c.—The British Engineering Standards Association have issued eight new British Standard Specifications for Blanc Fixe, Lead Chromes, Prussian Blue, Carbon Black, Bone Black, Vegetable Black, Lamp Black, and Mineral Black. They contain clauses regulating the composition, together with standard reception tests, for the purchase of these materials, as well as appendixes giving methods of carrying out the tests. These specifications have been prepared at the request of the paint manufacturers by a Committee representative of both the buying and manufacturing interests, and, as in the case of all British Standard Specifications, they will be reviewed as experience of their working or progress in the industry renders it necessary, and revised issues will be published from time to time. For the benefit of readers, it may be mentioned that copies of the new specifications (Nos. 281-288) can be obtained from the B.E.S.A. Publications Department, 28, Victoria Street, S.W. 1, price 2s. 2d. each, post free.

THE REAVELL PORTABLE AIR PLANT.

An Aid to Main Laying.

Much progress has been made by Messrs. Reavell & Co., Ltd., of Ranelagh Works, Ipswich, since they supplied their first compressor about twenty-five years ago. In those days the uses for compressed air were somewhat restricted, but to-day this convenient source of power is ever penetrating into new fields. For some time now gas undertakings have taken advantage of a mobile compressing plant, which can be readily started-up, to supply pneumatic tools for breaking-up concrete or for caulking joints; and a brief description of one of the latest models constructed by Messrs. Reavell will doubtless be of interest.



A Reavell Portable Compressor of the Latest Type.

We illustrate a machine equipped with a Reavell "Quadruplex" compressor, the compact arrangement of which makes this type most suitable for portable plants. It is highly efficient and can be perfectly balanced, which, combined with an even turning movement, gives the best arrangement for a petrol engine drive. The efficiency of the machine illustrated will be appreciated when it is mentioned that, with a piston displacement of only 153 c.ft. per minute, and taking only 26 H.P., it is able to supply four, or even five, large concrete breakers. The engine adopted for the machine pictured is the "Atlantic," built at Wishaw. This is essentially an industrial engine designed for continuous running on full load; and though it is more expensive than the lorry type engine, it has been found that the extra reliability is well worth the additional cost.

The compressor is coupled direct to the engine, thus avoiding the use of a reducing gear and making the plant quieter and more reliable. An air reservoir of ample capacity is provided, and a reliable type of automatic unloading device is fitted.

The standard plant has four steel wheels, but the set can be supplied with rubber tyred wheels (as illustrated), in which case the truck is supported on springs. This arrangement is very convenient, as it enables the plant to be taken from job to job behind a lorry at a good speed. The standard plant with steel wheels is fitted with a screw-on brake with wooden shoes, but on the sprung plant drum brakes are provided which can be operated from the lorry towing the unit.

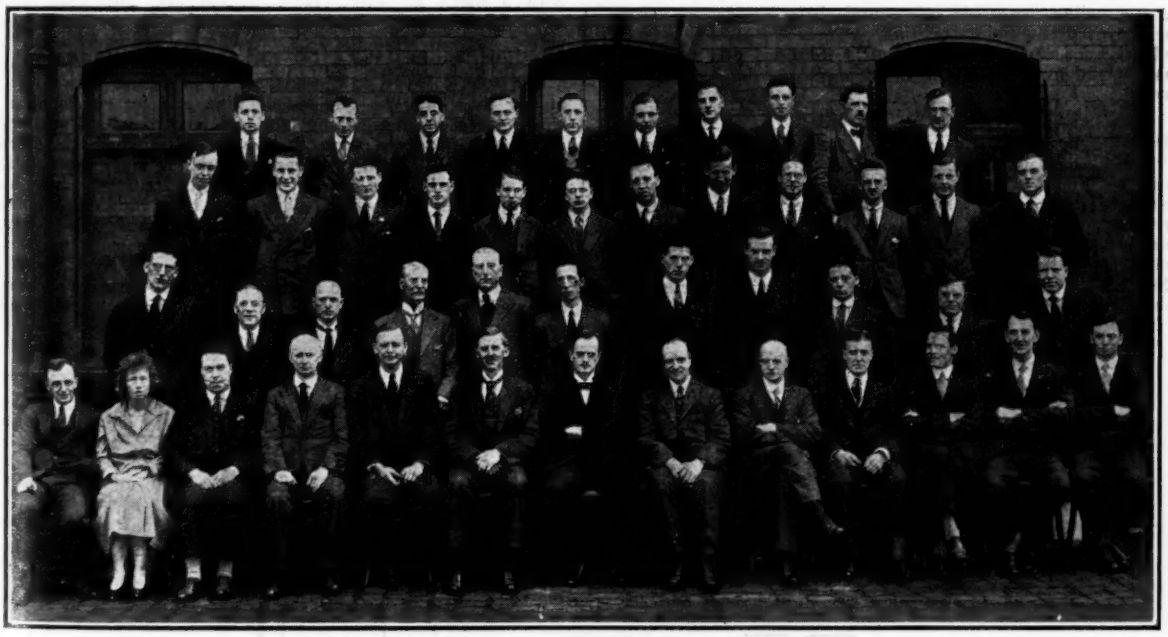
Some actual figures obtained by the South Metropolitan Gas Company may be of interest. They refer to a set of the size illustrated, working continuously, supplying air to four large paving breakers, the engine in this case was a four-cylinder "Thornycroft."

Working hours of compressor	123·25.	
Petrol consumption, 215 galls. . . .	=	1·75 galls. per hour.
Engine oil consumption, 6 galls. . .	=	0·05 "
Compressor oil consumption, 3½ galls.	=	0·03 "

The South Metropolitan Company also use a smaller type of compressor made by Messrs. Reavell. The compressor is mounted on a lorry, and is actually driven from the lorry engine. The advantage of such a unit is that in the case of a sudden leakage of gas in their system, the compressor, together with the men and tackle for making the repair, can be quickly on the spot.

CITY OF BIRMINGHAM GAS DEPARTMENT CHEMICAL STAFF.

The accompanying photograph of the staff of the Central Laboratory, Nechells, is reproduced from the "City of Birmingham Gas Department Magazine."



Top Row—R. R. Maskrey, A. Harbige, B. H. Cunningworth, H. A. Ward, D. J. Duncan, W. Grimsley, H. M. Stanley, M. Baker, L. W. Silva, A. Minshaw.
Second Row—C. L. Evans, J. A. Claydon, H. A. Cowles, A. C. Parish, J. K. Brookes, H. Smith, G. G. Buttery, C. F. Truslove, H. G. Tipper, K. W. Francombe, W. D. Cadwallader, F. H. Bate.
Third Row—F. H. Hawkins, W. Bragg, P. Millington, C. E. Jones, T. F. Cross, G. S. Garrett, D. W. G. Scott, E. Hayden, H. C. Bryant, A. B. Trickett, E. Branson.
Front Row—J. N. Shorrock, Miss G. Daniels, G. W. Smith. R. E. Jefferson, J. H. Gee, W. A. Twine, T. F. E. Rhead (Chief Chemist), W. J. Pickering, J. F. Smith, W. E. Giffen, A. R. Myhill, C. H. Shearman, E. T. Pickering.

It should be pointed out that the group is not quite complete, as the following members were absentees: J. Greaves, R. S. Gregory, N. C. Kirby, F. H. Nicholls, G. R. Poulton, D. N. Simmonds, E. Smith, W. Sutton, and H. Walton.

AN EXAMINATION OF THE PRODUCTS OF COMBUSTION FROM COAL GAS FLAMES.

By HAMILTON DAVIES, B.Sc., and HAROLD HARTLEY, D.Sc.

The possibility of the occurrence of carbon monoxide among the products of combustion from flames has received the attention of numerous investigators. In view of the conflicting nature of the published results, the authors considered that a re-examination of the matter was desirable; and with this object refinements were introduced in the method of determining carbon monoxide by means of iodine pentoxide, enabling an accuracy of 1 to 2 parts per million to be attained. The method, as employed by the authors, has been described in the "JOURNAL" for June 9, 1926, p. 530. The procedure there detailed was, in general, followed, but certain modifications were introduced, which will be indicated where necessary.

The investigation described below consisted in the simultaneous determinations of the carbon monoxide in the products from coal gas flames and that in the air of the laboratory.

DESCRIPTION OF THE APPARATUS.

The apparatus (see fig.) consisted of two similar parts—(1) an air-testing system, and (2) a reaction system. In the first of these the determination of the carbon monoxide in the air of the laboratory was effected, and the second system was employed for the examination of the products of combustion.

The iodine pentoxide tubes were of glass, ¾ in. bore and 26 in. long. The columns of powdered reagent were continuous, 10½ in. long, and were retained in position by means of pads of glass wool at each end. They were heated at 125° in a small gas-fired oven which was thermostatically controlled.

The products of combustion from the oven were led into a flue, and the only additional gas consumed in the laboratory was that required for the burner under examination.

The inlet ends of the pentoxide tubes, which projected 7 in. outside the oven, were closed by means of one-hole rubber stoppers, and selected red rubber pressure-tubing was used where necessary throughout the system. The attainment of "blanks" of one part per million indicated that the use of rubber in the system did not affect the results. The tubes were reversed during the series of experiments, and were found to give similar results. Reversal of the tubes was also necessary for the determination of their "blanks." The special absorption vessels previously described (*loc. cit.*) were used throughout the work, and freshly prepared 4 p.ct. potassium iodide solution was employed to absorb the iodine liberated.

No lubricant was used on the ground-glass joints connecting the iodine pentoxide tubes and their absorption vessels. The halves of the joints on these vessels were dried after introduction of the potassium iodide solution, and each joint was covered by a short length of pressure-tubing of suitable bore.

THE PURIFYING TRAINS.

Preliminary work had indicated that the concentration, if any, of carbon monoxide produced by freely burning flames must be small. The amount of unsaturated hydrocarbons would, if present, be so minute as to be negligible. It was, therefore, decided only to remove, and determine when required, water vapour by means of anhydrous calcium chloride and carbon dioxide (with oxides of sulphur) by means of "Sofnolite." Final drying of the gases was effected with anhydrous calcium chloride and phosphorus pentoxide before passage through the iodine pentoxide tubes. The results attained in the present series of experiments indicate that iodine pentoxide retains its activity towards carbon monoxide after being in circuit with phosphorus pentoxide for a prolonged period.

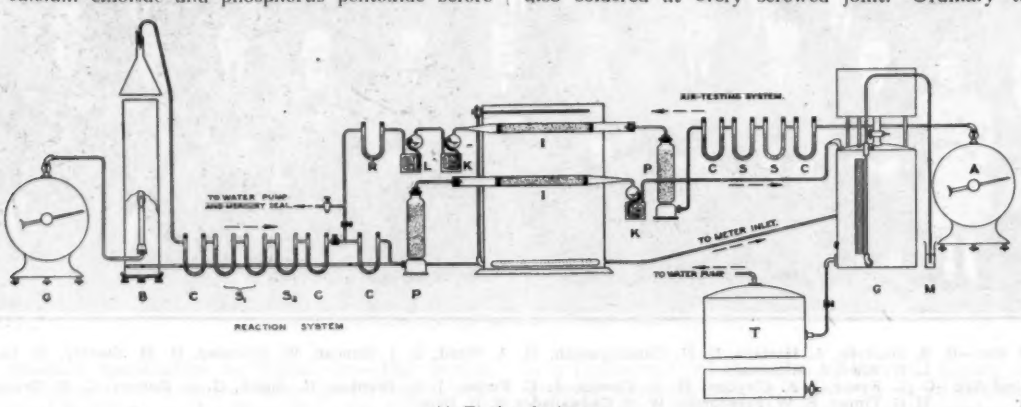
When the presence of unsaturated hydrocarbons in appreciable concentration in a sample of gases is suspected, and the inclusion of fuming sulphuric acid in the purifying train is necessary, it is essential to eliminate completely traces of sulphur trioxide before the sample is passed through the iodine pentoxide. We have found that the passage of air free from carbon monoxide, but contaminated with a trace of sulphur trioxide, over heated iodine pentoxide results in an abnormally high emission of iodine. Thus a reaction tube which normally gave a "blank" equivalent to one part of carbon monoxide per million, gave a result of 100 parts when the air contained a trace of sulphur trioxide. This observation confirms the statement of Lamb, Bray, and Geldard that sulphuric acid promotes the decomposition of iodic acid during dehydration (J. Amer. Chem. Soc., 1920, **42**, 1636). Sinnatt and Slater (Lancashire and Cheshire Coal Res. Assoc., Bull. 13, 1923) also found that fuming sulphuric acid could be employed to remove unsaturated hydrocarbons provided the gas is afterwards slowly bubbled through potassium hydroxide solution. It must be emphasized, however, that efficient scrubbing is essential, and in our opinion the ordinary bubbler is not satisfactory for this purpose. We recommend the use of potassium hydroxide solution in the special absorption vessels to which reference has been made. A soda-lime tube should be interposed between the acid and the potash vessels. The completeness of removal of sulphur trioxide can be ascertained by the attainment of the normal "blank."

In some of the experiments a 50 p.ct. solution of potash was included in the purifying train of the air-testing system. In others the removal of carbon dioxide from the laboratory air sample was effected by means of dry "Sofnolite," as used in the reaction system. An anhydrous calcium chloride tube preceded the "Sofnolite" tubes. Substitution of the dry for the liquid reagent did not affect the results. The purifying trains of both systems as employed in the later experiments are shown in the drawing.

TYPES OF FLAME INVESTIGATED.

With two exceptions (Expts. 2 and 11), the flame under examination was shielded from draughts by surrounding it with a metal cylinder. Both bunsen and luminous flames were investigated. In the case of the former, two alternative burners were used. One was an ordinary laboratory bunsen burner (¾ in. bore), to which gas was supplied through a lead tube soldered to the burner. The second was a special burner in which the gas supply pipe and jet consisted of a single piece of glass tubing, the inlet end of which was some distance outside the protecting cylinder in which the burner was mounted. Both well-aerated and poorly-aerated flames were employed. The primary aeration in the former was such that the inner cone of the flame was blue and approximately 1 in. high. In the case of the latter the flame was just non-luminous.

The luminous flame was obtained by use of a Bray jet screwed and soldered into a brass pipe, or by an Argand burner also soldered at every screwed joint. Ordinary thin-walled



Air-Testing System.

A.—Air meter. C.—Anhydrous calcium chloride. S.—"Sofnolite." P.—Phosphorus pentoxide. I.—Iodine pentoxide. K.—4 p.ct. potassium iodide. L.—50 p.ct. potash. R.—Soda-lime.

Reaction System.

G.—Gas meter. B.—Burner with sampling arrangements. C.—Anhydrous calcium chloride. S_1.—"Sofnolite"-anhydrous calcium chloride tubes for weighing. S_2.—"Sofnolite"-anhydrous calcium chloride témoin tube. P.—Phosphorus pentoxide. I.—Iodine pentoxide. K.—4 p.ct. potassium iodide. G.—Calibrated holder. M.—Mercury gauge. T.—Large cylinder.

rubber tubing generally employed in laboratories to make gas connections cannot be regarded as impermeable, and was not used in essential parts of the apparatus. No joints were made either within, or in proximity to, the protecting cylinder from within which the sample of laboratory air was taken.

The bunsen burners were operated at a mean consumption of 4·3 c.ft. per hour, and a pressure of 21-tenths W.G. at the meter.

The luminous (Bray) burner consumed 4·8 c.ft. per hour at a pressure of 6-tenths W.G. In some experiments the consumption was raised to 5·7 c.ft. per hour by pressure increase. The flame was steady, with no tendency to "blow away" from the jet.

The Argand burner was, in general, used at 7·6 c.ft. per hour, this consumption being determined by the governor embodied in the burner.

The gas was London coal gas, the gross calorific value of which varied between 490 and 500 B.Th.U. per c.ft. at 60° Fahr. and 30 in. bar., saturated. A typical analysis was: CO_2, 3·7; O_2, 0·7; unsaturated hydrocarbons, 3·7; CO, 21·0; CH_4, 18·1; H_2, 40·5; and N_2 (by difference), 12·3 p.ct. Volume of air required for combustion of 1 c.ft. of gas, 4·036 c.ft.; yielding 0·539 c.ft. of CO_2 + 3·311 c.ft. of N_2; total, 3·85 c.ft.

Sampling the Products of Combustion and Laboratory Air.

The taps on a laboratory gas supply system, though apparently gas-tight, produce a concentration of carbon monoxide in the air of the room generally considerably in excess of that normally existing in the outside air. The concentration may also vary from day to day. In an investigation of the present nature it is, therefore, necessary to ensure adequate sampling of the air supply and of the products of combustion simultaneously. In the case of the latter the method employed in some of the experiments consisted in inverting a glass filter funnel of 4 in. diameter at a suitable height (2½ in.) above the extreme tip of the flame, which was protected from draughts by means of a large cylinder 10 in. in diameter and 14 in. high. In other experiments, in which the burner under examination was protected by a length of sheet-iron pipe of 4 in. diameter, a funnel (diameter 5 in.) was inverted at a height of either 1 in. or 1¼ in. above the top of the pipe. In each case the stem of the funnel was connected directly to the purifying train of the reaction system. Both arrangements allowed the products of combustion to diffuse freely away from the flame zone; the carbon dioxide in the samples being reduced to less than 2 p.ct. In three experiments (Nos. 1, 2, and 11) the method of sampling employed resulted in a smaller degree of dilution of the products. Unrestricted flow of the products away from the flame zone must be ensured, since it was found that otherwise an abnormal amount of carbon monoxide was produced. Previous workers have also noted the increased production of carbon monoxide from flames, resulting from pollution of the atmosphere by carbon dioxide and reduction in the percentage of oxygen.

Two alternative means were employed to sample the air used for combustion. When the flame was protected by the large sheet-iron cylinder, referred to above, the air within the cylinder was sampled all round the base of the burner by means of a 6 in. diameter circular brass tube of $\frac{5}{32}$ in. bore pierced with a large number of fine holes. In the experiments in which the 4 in. diameter pipe was used to shield the flame, a brass cross-piece pierced with 24 fine holes (six in each arm) was supported, holes downward, just below the burner. Thus the air flowing up the pipe was sampled across two diameters.

The protecting cylinders were raised 1 in. above the bench. The free end of the circular brass tube, or cross-piece, was connected to the inlet of the meter in the air-testing system.

Measurement of the Volumes of the Samples.

The sample of laboratory air was measured by means of a wet test-meter of 0·1 c.ft. capacity per revolution placed at the inlet end of the purifying train. By the use, at the outlet end of the system, of a water pump in conjunction with a suitable mercury seal, a constant suction in the air-testing system was maintained. To ensure that the use of a wet test-meter did not vitiate the air results, the method was checked by determining the carbon monoxide content of the air by means of the reaction system.

The sample of products of combustion was purified, passed through the iodine pentoxide tube and potassium iodide absorption vessel, and the residual gases were collected over water in a gas-tight copper holder of 20 litres capacity, which had been calibrated against the meter. The lower outlet of the holder was connected to a large cylinder to which suction was applied by means of a second water pump. A screw clip on the connection between the holder and cylinder enabled a constant suction, as indicated by a mercury gauge, to be maintained in the reaction system.

Experimental Methods.

The air-testing and reaction systems were connected by means of a branch tube which could be closed by a screw clip. Thus the systems could be used independently (during the sampling of the products), or in conjunction when it was desired to sweep out the reaction system with air free from carbon monoxide.

The iodine pentoxide tube used for the determination of the carbon monoxide in a sample of products of combustion should be brought into equilibrium with air free from carbon monoxide (supplied by the air-testing system) both before and after the passage of the sample. This procedure is to be regarded as the standard method, but it involves a thorough sweeping-out of the reaction tube after the passage of the sample if every trace of iodine is to be removed. The retention of iodine by iodine pentoxide is illustrated by the fact that some 4 litres of products of combustion containing approximately 20 parts of carbon monoxide per million may be passed through iodine pentoxide previously in equilibrium with air free from carbon monoxide before iodine is noticed in the iodide solution contained in the absorption vessel.

At rates of aspiration up to 35 c.c. per minute, the time occupied by the passage of the sample amounted to some 6 hours, and it was not possible to free completely the reaction tube from iodine in the course of a working day. The procedure adopted, therefore, consisted in sweeping out the reaction system with air free from carbon monoxide for some 2½ to 3 hours, and titrating the iodine collected with N/500 sodium thiosulphate. Fresh 4 p.ct. potassium iodide solution was then introduced into each absorption vessel, and the sweeping-out was continued overnight. The free iodine remaining in the tube resulted in an overnight "blank" equivalent to 2 to 3 parts of carbon monoxide per million of air passed, as compared with the normal "blank" equivalent to 1 part per million. In the calculation of the results, as shown later, the additional thiosulphate required for this iodine was added to the quantity used in the first titration. This method will be referred to as "Method A.1."

In order to reduce the time required for an experiment, the possibility of working at high rates of aspiration was investigated. It was found that removal of carbon monoxide from the samples of products of combustion, or air, by the quantity of iodine pentoxide used was complete at a rate of 70 c.c. per minute, or even higher. The simplification of the purifying trains, referred to previously, and especially the substitution of solid for liquid reagents, materially reduced their resistance. Two 6-in. **U**-tubes charged with "Sofnolite" (with short columns of anhydrous calcium chloride at the exits) were found sufficient to remove carbon dioxide from the products of the air, and the special absorption vessels containing 4 p.ct. potassium iodide effectively retained the iodine.

The speed of 20 to 25 c.c. per minute, recommended in our earlier communication, had largely been determined by the resistance of the purifying system and the efficiency of the liquid reagents therein. When, in the examination of products of combustion from a gas-heated appliance, fuming sulphuric acid is included in the purifying train, speeds of this order are still advocated.

Working at a rate of approximately 70 c.c. per minute, the passage of the sample of products occupied some 3 hours, and it was found that complete removal of the iodine from the reaction tube, by means of air free from carbon monoxide, could be effected in a further period of 3 to 3½ hours, using approximately 0·4 c.ft. of air as read on the meter of the air-testing system. This method will be referred to as "Method A.2."

In both cases the iodine pentoxide tube of the air-testing system was maintained in continuous equilibrium with the laboratory air. Before an experiment was begun, sufficient air was passed to effect the attainment of the equilibrium corresponding with the conditions of the experiment.

In certain other experiments the systems were used independently throughout. The reaction tube was not swept out with air free from carbon monoxide, but was maintained in equilibrium with the products of combustion under examination. Before each experiment the iodine pentoxide tubes were first brought into equilibrium with products and air respectively by aspirating at a rate of some 70 c.c. per minute for 1½ to 2 hours. This preliminary treatment was found to be sufficient, as the concentrations of carbon monoxide, to be determined in successive experiments, were of the same order. During the preliminary period, spare "Sofnolite" tubes were used to absorb the carbon dioxide from the products of combustion, and temporary absorbers to take up the iodine evolved. Weighed tubes, together with the special absorption vessels containing freshly-prepared potassium iodide solution, were substituted at the beginning of the experiment proper. At the same time the holder, previously filled with water, was brought into circuit in the reaction system.

After some 14 litres of products and an equal volume of air had been passed, the necessary measurements were made, and the titration of the iodine collected was effected in the manner described in our previous communication.

This method, "B," is applicable only when little variation takes place in the carbon monoxide content of the samples examined from day to day, and in any case is not recom-

mended if the total carbon monoxide exceeds 25 parts per million.

OTHER MEASUREMENTS MADE.

In the majority of the experiments the water vapour in the products of combustion and in the air was determined, but variation in the percentages did not appear to influence the production of carbon monoxide.

In addition, the carbon dioxide in the air was determined by means of the Haldane apparatus. The normal variation between 5 and 8 parts per ten thousand found did not appear to influence the results attained. During two experiments (Nos. 10 and 27) the doors and windows of the laboratory were kept closed, and the decrease in ventilation thereby effected was indicated by an increase in the carbon dioxide to 15 parts per ten thousand. In these two experiments the CO : CO_2 ratio in the diluted products was higher than the normal figure.

CALCULATION OF THE CONCENTRATION OF CARBON MONOXIDE.

In our former communication we showed that the "blank" produced when air free from carbon monoxide is passed over purified iodine pentoxide, heated and conditioned, is due to the carrying-over of oxy- or hydroxy-compounds, and can be reduced by suitable treatment to an amount equivalent to 1 part of carbon monoxide per million of air passed. The existence of the "blank" does not complicate the reaction between carbon monoxide and the iodine pentoxide, and its thiosulphate value can be subtracted in the calculation of the results.

When experimental methods "A.1" and "A.2" were used, the following calculation was made:

For the reaction system, the sum of the volume of residual gases in the holder and the volume of air used in the sweeping-out process, all corrected to N.T.P. dry, represented the volume passed through the iodine pentoxide, for which the "blank" correction was necessary. The "blank" was known in terms of c.c. of N/500 thiosulphate per 10,000 c.c. of air, and the value for the total volume passed was evident. This value was subtracted from the amount of thiosulphate required for the titration of the iodine. The difference represented the thiosulphate equivalent to the iodine liberated by the action of the carbon monoxide in the sample. As an example:

Volume in holder: 11,830 c.c. at N.T.P. Volume of air used for sweeping out: 10,650 c.c. at N.T.P. Total volume passed: 22,480 c.c. Known "blank" of reaction tube: 0·089 c.c. of N/500 thiosulphate per 10,000 c.c. air at N.T.P. Thiosulphate to be subtracted: 0·20 c.c. Thiosulphate used in titration: 3·78 c.c. Hence, N/500 thiosulphate equivalent to carbon monoxide in sample = 3·58 c.c. Volume of carbon monoxide in sample = 3·58 × 0·112 = 0·40 c.c. N.T.P.

In method "B" in which no sweeping-out process was employed, the "blank" correction was applied for the holder volume only.

For the air-testing system, the correction was calculated for the volume, measured on the meter, in which the carbon monoxide concentration was determined.

The concentration of the carbon monoxide in the products of combustion was calculated on the sum of the volumes, dry at N.T.P., of residual gases in the holder and of the carbon dioxide absorbed by the "Sofnolite" tubes. The concentration of carbon monoxide in the laboratory air was calculated on the volume recorded on the meter after correction to N.T.P. Examination of a number of the coal gas analyses showed that, after combustion, the volume of carbon dioxide *plus* nitrogen was approximately 4·5 p.ct. less than the volume of air theoretically required for complete combustion. At the degree of dilution used in the experiments the difference in volume between the air entering the system and the products *plus* air leaving the system (both dry at N.T.P.) was negligible.

RESULTS OF THE EXPERIMENTS.

The various experimental methods and the results with bunsen flames, both well and poorly aerated, are given in Table I. Similar details for the luminous flame from the batswing and Argand burners are shown in Table II.

In column "K" are given the differences between concentration of the carbon monoxide in the diluted products and that in the air of the laboratory for each experiment. It will be noticed that in the majority of cases the diluted products contain more carbon monoxide than the laboratory air, thus indicating definitely that there is some escape of carbon monoxide from the combustion zone.

It is evident that the carbon monoxide in the air which actually enters into the combustion must take part in the water gas equilibrium existing in the interconal gases, and, in consequence, the concentration of carbon monoxide in the diluted products of combustion would, in all cases, be smaller than in the air, unless there were an actual escape of this gas.

It is not known what proportion of the total air flowing around the flame takes part in the combustion phenomena. If it be assumed, however, that only the amount of air required for completion of combustion takes part in the reaction, it is possible to calculate the actual amount of carbon monoxide present in the undiluted products.

In the region of the flame zone there are two streams, consisting respectively of products and excess air.

If $(CO)_m$ is the concentration of carbon monoxide in the diluted products, $(CO_2)_m$ that of carbon dioxide in the diluted

TABLE I.

Expt. (A).	Burner. (B).	Flame. (C).	Sampling. (D).	Method (E).	Diluted Products. P.Ct. CO_2. (F).	Diluted Products. CO per 10^6. (G).	Air, CO per 10^6. (H).	G − H. (K).	$\frac{(CO)_m - (CO_a)}{(CO_2)_m}$. (L).	$\left(\frac{CO}{CO_2}\right)_p$. (M).
1	Lab. bunsen in large protecting cylinder	Well aerated	Products: Above cylinder Air: Around burner	A.1	6·04	31	14	17	0·00028	0·00039
2	Lab. bunsen unprotected	,,	Products: 1 in. above flame tip Air: Around burner	,,	4·18	10·8	6·6	4·2	0·00010	0·00015
3	Lab. bunsen in large protecting cylinder	,,	Products: 2½ in. above flame tip Air: Around burner	,,	1·576	11·4	8·7	2·7	0·00017	0·00024
4	,, ,,	,,	,,	,,	1·685	7·2	7·2	0·0	0·0	0·00006
5	,, ,,	,,	,,	,,	1·544	13·2	9·3	3·9	0·00025	0·00032
6	Special bunsen in 4-in. cylinder 16½ in. high	,,	Products: 1 in. above cylinder Air: By cross-piece below burner	A.2	1·386	16·4	14·4	2·0	0·00014	0·00025
7	,, ,,	,,	,, ,,	,,	1·456	16·6	15·2	1·4	0·0001	0·00022
8	,, ,,	,,	,, ,,	,,	1·455	10·3	6·8	3·5	0·00024	0·00029
9	Special bunsen in 4-in. cylinder 24 in. high	,,	Products: 1½ in. above cylinder Air: By cross-piece below burner	B	0·847	14·2	12·9	1·3	0·00015	0·00025
									mn. 0·00016	mn. 0·00024
10	,, ,,	,,	,, ,,	,,	0·773	21·7	18·4	3·3	0·00043	0·00057 CO_2 in air = 15 per 10^4
11	Lab. bunsen unprotected	Poorly aerated	Products: 1 in. above flame tip Air: Around burner	A.1	3·86	16·0	7·7	8·3	0·00022	0·00028
12	Lab. bunsen in large protecting cylinder	,,	Products: 2½ in. above flame tip Air: Around burner	,,	1·326	22·4	19·9	2·5	0·00019	0·00034
13	,, ,,	,,	,,	,,	1·322	18·9	16·3	2·6	0·00020	0·00033
14	,, ,,	,,	,,	,,	1·14	10·7	7·1	3·6	0·00031	0·00036
15	Special bunsen in 4-in. cylinder 16½ in. high	,,	Products: 1 in. above cylinder Air: By cross-piece below burner	A.2	1·433	14·4	10·0	4·4	0·0003	0·00038
16	Special bunsen in 4-in. cylinder 24 in. high	,,	Products: 1½ in. above cylinder Air: By cross-piece below burner	B	0·784	10·8	8·3	2·5	0·00032	0·00038
17	,, ,,	,,	,, ,,	,,	0·734	12·7	10·9	1·8	0·00026	0·00034
									mn. 0·00026	mn. 0·00034

TABLE II.

Expt. (A).	Burner. (B).	Flame. (C).	Sampling. (D).	Method. (E).	Diluted Products. P.Ct. CO_2. (F).	Diluted Products. CO per 10^6. (G).	Air, CO per 10^6. (H).	G – H. (K).	$\frac{(CO)_m - (CO_a)}{(CO_2)_m}$ (L).	$\left(\frac{CO}{CO_2}\right)_p$. (M).
18	Batswing burner in 4-in. × 16½-in. cylinder	Luminous	Products: 1½ in. above cylinder Air: by cross-piece below burner	A2	0·964	10·3	10·3	0 0	0·0	0·00008
19	,, ,,	,,	Products: ⅝ in. above cylinder Air: by cross-piece below burner	,,	1·198	8·3	7·2	1·1	0·00009	0·00015
20	,, ,,	,,	,, ,,	,,	1·212	7·05	7 9	– 0·85	– 0·00007	0·0
21	,, ,,	,,	Products: 1½ in. above cylinder Air: by cross-piece below burner	,,	1·30	10·8	9·7	1·1	0·00008	0·00015
22	Argand at 4 c.ft. per hour in 4-in. × 24-in. cylinder	,,	Products: 1½ in. above cylinder Air: by cross-piece below burner	B	1·08	17·9	17·9	0·0	0·0	0·00014
23	Argand at 7·45 c.ft. per hour. Same cylinder	,,	,, ,,	,,	1·978	17·4	19·6	– 2·2	– 0·00011	+ 0·00004
24	Argand at 7·58 c.ft. per hour. Same cylinder	,,	,, ,,	,,	1·354	17·9	18·5	– 0·6	– 0·00004	+ 0·0001
25	Argand at 7·63 c.ft. per hour. Same cylinder	,,	,, ,,	,,	1·975	14·1	13·6	0·5	0·00003	0·00013
26	Argand at 7·56 c.ft. per hour. Same cylinder	,,	,, ,,	,,	1·95	12·1	10·5	1·6	0 00008	0·00016
										mn. = 0·0001
27	Argand at 7·63 c.ft. per hour. Same cylinder	,,	,, ,,	A2	2·187	33·2	18·7	14·5	0·00066	0·00080 CO_2 in air = 15 per 10^4

NOTE.—Unless the gas consumption is controlled, an Argand burner may, however, emit carbon monoxide in an appreciable amount owing to a deficiency in the air supply to the flame. The air supply is limited by the construction of the burner.

products, $(CO)_p$ that of carbon monoxide in the products leaving the combustion zone, $(CO_2)_p$ that of carbon dioxide in the products leaving the combustion zone, $(CO)_a$ the concentration of carbon monoxide in the air supply, V_p the volume of undiluted products, and V_a the volume of excess air, then

$$(CO_m) = [(CO)_p V_p + (CO)_a V_a]/(V_p + V_a)$$

whence it can be shown that

$$\left(\frac{CO}{CO_2}\right)_p = \frac{(CO)_m - (CO)_a}{(CO_2)_m} + \frac{(CO)_a}{(CO_2)_p} \quad . \quad . \quad . \quad (1)$$

In column "M" the calculated values for $(CO : CO_2)_p$ are given for each experiment. These values represent the $CO : CO_2$ ratio for undiluted products of combustion.

Omitting experiments 10 and 27, to which reference has been made, the following are the mean values of the $CO : CO_2$ ratio for the undiluted products:

Well-aerated bunsen flame	0·00024
Poorly ,, ,, ,, ...	0·00034
Luminous flame	0·0001

These ratios correspond with the following concentrations of carbon monoxide in undiluted dry products of combustion:

Well-aerated bunsen flame . . .	31 parts per million.
Poorly ,, ,, ,, . . .	44 ,, ,,
Luminous flame	13 ,, ,,

These figures represent the maximum concentration of carbon monoxide in dry products of combustion. This is evident from a consideration of the equation:

$$(CO)_p = (CO_2)_p[(CO)_m - (CO)_a]/(CO_2)_m + (CO)_a \quad . \quad . \quad (2)$$

for if more air than that required theoretically for complete combustion takes part in the reaction, then $(CO_2)_p$ will be reduced. The values for the expression $[(CO)_m - (CO)_a]$: $(CO_2)_m$ as determined experimentally are given in column "L."

ACCURACY OF THE METHOD.

All the experimental errors enter into the calculation of these ratios; and, with the exception of certain experiments with the well-aerated bunsen flame, the concordance was as good as that for which we had hoped. In view of the divergencies referred to, a re-investigation of the accuracy attainable with our apparatus was accordingly undertaken as follows:

Laboratory air was passed through both systems. In the first experiments the reaction tube was brought into equilibrium with air free from carbon monoxide, both before and after the passage of the sample, thus imitating the experimental conditions of methods "A.1" and "A.2." The other tube was in equilibrium with laboratory air throughout. The results differed by 1·0 to 1·5 parts per million—that from the reaction tube being, in general, the higher. In other experiments both tubes were maintained in equilibrium with laboratory air throughout, according to method "B." The results differed by a mean of 1·2 parts per million, which might be greater for the reaction tube or the reverse.

SUMMARY.

(1) The iodine pentoxide method of determining carbon monoxide has been used to investigate the combustion products from flames. An accuracy of between 1 and 2 parts per million has been attained.

(2) Flames burning in the air of an ordinary room appear to emit traces of carbon monoxide.

(3) An endeavour has been made to calculate the ratio between the carbon monoxide and dioxide in the undiluted products of combustion; and the mean values found for this ratio for the well-aerated bunsen, poorly-aerated bunsen, and luminous flames are respectively 0·00024, 0·00034, and 0·0001.

(4) The concentrations of carbon monoxide in the undiluted dry products have also been calculated, and for the three types of flame are 31, 44, and 13 parts per million respectively.

In conclusion, the authors, while thanking Mr. H. James Yates, the Chairman of Radiation Limited, for permission to publish these results, wish to take this opportunity of expressing their appreciation of the encouragement received from him during the course of the work.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

"Cheap Gas."

SIR,—It was with much interest that I read your reference to "The Cheapest Gas," in your issue dated Aug. 3; and I thought it would be of interest to you that the Macclesfield Council gave sanction to the Gas Committee's recommendation for power charges at their meeting yesterday, the scale of charges being as follows:

Where the consumption of gas per quarter is above 60 p.ct. of the assessment of the brake horse power of maximum demand of the engine, the charge for gas consumed to be:

Charge per Quarter.

For the first	125 therms	6·00d.	per therm
,, next	125 ,, ...	5·75d.	,,
,, ,,	125 ,, ...	5·50d.	,,
,, ,,	125 ,, ...	5·25d.	,,
,, ,,	250 ,, ...	5·00d.	,,
,, ,,	250 ,, ...	4·75d.	,,
,, ,,	800 ,, ...	4·50d.	,,
,, ,,	800 ,, ...	4·40d.	,,
,, ,,	800 ,, ...	4·30d.	,,
,, ,,	800 ,, ...	4·20d.	,,
,, ,,	800 ,, ...	4·10d.	,,
For any number over	5000 therms . .	4·00d.	,,

H. CURTIS.

Corporation Gas-Works,
Macclesfield, Aug. 4, 1927.

REGISTER OF PATENTS.

Valves.—No. 273,067.

GROVES, W. W., of Southampton Buildings, W.C. 2 (a communication from the American Gas Construction Co.).

No. 13,226; May 25, 1926.

The object of the invention is to provide, for gas making plant, a simple and efficient hot valve which can be placed between the generator and carburettor, between the carburettor and superheater, between the superheater and stack, or in the conduit leading from the superheater to the waste-heat boiler.

The valve structure comprises a seating ring surrounding the valve opening and having a sharp edge directed parallel to its axis, and a metal valve plate having an annular flat hard surface normal to the axis of the valve adapted to engage with the sharp edge of the ring, and steam power means for positively moving the valve plate axially and rapidly against the ring, so that any deposits on the valve and ring are cut through and a tight engagement of the plate and ring is ensured.

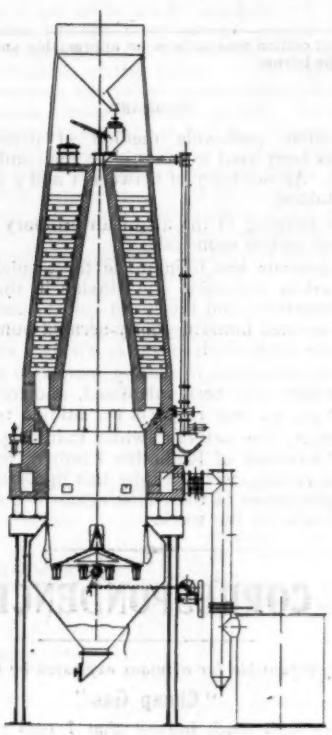
The invention further consists in mounting the valve plate on an actuating rod for universal or gyratory movement about the rod, in the provision of steam actuated means for moving the rod, in cooling means for the seating ring, and in a construction of the valve plate for holding cooling water.

Distillation of Coal, &c.—No. 273,389.

DAVIDSON, T. M., of Hatch End.

No. 8590; March 30, 1926.

This invention relates to carbonization of solid carbonaceous substances, and to a retort for use in carrying out the method.



T. M. Davidson's Retort.

The shape of the retort used is of an upwardly tapering cross section, such that, upon the partial discharge of the coke residue from the lower end thereof, the sides of the main part of the charge move away from the inner faces of the retort walls, so that an interstitial space is produced into which a further charge of coal is allowed to fall. Thus the original charge is substantially surrounded by a fresh layer, and on the continuation of the treatment, the fresh charge is subjected to heat from the retort walls as well as from the partially gasified charge. By such means the fresh charge is subjected in a more or less uniform thin layer to heat from two sides, whereby the transmission of heat is rapidly effected, while, inasmuch as the mass of the original charge is porous, the removal of the gas produced is facilitated.

It will be understood that such a method of distillation is advantageously effected by the periodic discharge of the coke residue from the lower end of the retort at a time when the degasification has proceeded to the extent of rendering the charge, or a substantial part of it, incandescent; and the distillation of the fresh charge is then continued so that the fresh charge becomes integral with the original charge.

The retort at its lower end is extended outwardly, and provided with an inwardly and downwardly inclined bottom, while a bridge is centrally provided at the lower end of the retort.

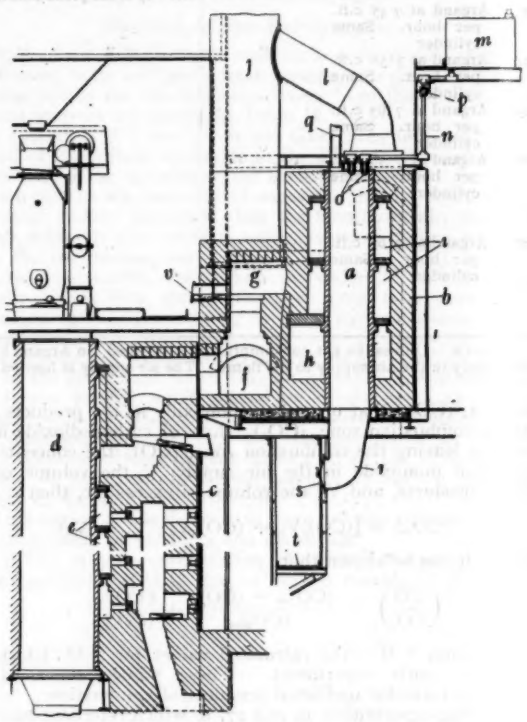
These features and others will be understood from the sectional elevation which we reproduce of one form of retort. A detailed description, of course, accompanies the specification.

Vertical Retort Settings.—No. 273,474.

WEST, F. J. & E., and WEST'S GAS IMPROVEMENT CO., LTD., all of Miles Platting.

No. 15,421; June 18, 1926.

This invention comprises the combination with a vertical retort setting and with the combustion chambers thereof of an oil-gas generator disposed so as to form part of the setting and to be heated by the waste gases from the heating chambers of the vertical retorts; the oil gas and coal or like gas being mixed before use to produce a gas of the desired calorific value.



West's Oil Gas Producer for Coal Gas Settings.

The design of one form of setting is shown in a side elevation which we reproduce.

The oil gas generator *a* is arranged in the setting *b* at one side of, and forming a part or extension of, the setting *c* of the coal gas retort. The setting *b* receives the hot waste gases which rise from the various combustion chambers, as *e*, provided round the coal gas retorts in the usual manner. The said waste gases pass by way of the flues *f* and *g* to the chamber *h* on the exterior and near the base of the oil gas generator *a*, and thence through the circulating chambers *i* and on to the chimney *j* by way of the flue *k* and pipe *l*.

The oil to be distilled is fed by gravity from the tank *m* by way of the pipe *n*, which has spreaders or distributors, as *o*; the flow of oil being controlled by a regulating valve *p*. The oil gas leaves the generator by the off-take pipe *q*, through which it is carried away to be purified and subsequently mixed with the coal gas from the retorts *d*.

A pipe or trunk *r* with door or cover plate *s* is provided at the lower end of the oil gas generator, for the periodic cleaning-out of carbon or other deposit or residual. A platform *t* gives access to the door *s*.

The waste gases, or a portion of the same, may be carried direct from the chamber *h* to the chimney *j* by a by-pass flue; dampers being provided for this purpose.

A modification of the design is also described and illustrated.

Treatment of Gases with Liquids.—No. 273,103.

PEASE, E. L., of Darlington.

No. 17,041; July 7, 1926.

This invention relates to a process of extracting ammonia from gases wherein the ammonia is absorbed by washing the gases with an aqueous suspension of calcium sulphate in presence of carbon dioxide, so as to produce a mixture of calcium carbonate and a solution of ammonium sulphate. The invention provides a simple and convenient process for treating the mixture to liberate the ammonia and to regenerate a suspension of calcium sulphate, and depends upon the fact that the mixture of calcium carbonate and ammonium sulphate solution is unstable at higher temperatures, and tends to evolve ammonia. Thus, if the calcium sulphate suspension

is heated to a suitable temperature—for example, 80° to 90° C.—ammonia is evolved, and there remains a suspension of calcium sulphate which is suitable for washing a further quantity of ammoniacal gases.

The invention is particularly applicable to the extraction of ammonia from town gas. In this application it is preferred to conduct the tar-wash while the gas is still hot, and then to pass the gas (say, at about 50° to 60° C.) in counter-current to the calcium sulphate slurry, which may thereby attain a temperature of, say, 50° C. The hot spent slurry may then be withdrawn and heated to a somewhat higher temperature (for instance, 80° to 90° C.), preferably under reduced pressure. Ammonia is liberated, and may be absorbed, conveniently in a suitable acid porous mass, while the calcium sulphate slurry is regenerated wholly or in part, and may be returned to the ammonia-extraction process after cooling. The liberation of ammonia may be assisted by passing a current of air or other suitable gas through the heated suspension.

During the liberation of ammonia from the spent slurry, some concentration of the liquor, which may be somewhat diluted owing to condensation of water vapour from the gas, may occur. The slurry may, however, be used to absorb ammonia from cooled gas, and may be heated by an independent source of heat. The invention is particularly applicable to cases where fresh supplies of calcium sulphate are not conveniently available.

Gas Cookers.—No. 273,411.

MARWOOD, F. T., of Blackburn.

No. 8995; April 6, 1926.

According to this invention a single gas oven is mounted in an outer casing in such manner that a flue space extends along the bottom of the oven, up the sides, and over the top. The burner for heating the oven is arranged in the bottom flue space, and it comprises a number of horizontal pipes of different lengths branching from opposite sides of a central supply pipe. The flames from these burners impinge on the oven bottom, which may be constructed of cast iron or reinforced with a cast-iron plate. The hot gases from the flames travel along the bottom of the oven in opposite directions, pass up the sides, travel over the top, and escape through a flue at the back of the cooker. A deep space advantageously exists between the top of the oven and a hotplate at the top; and interposed between this hotplate and the top of the oven is a small oven for grilling or roasting small articles of food. The small oven is provided with a separate door. The hotplate derives a portion of its heat from the gases that have circulated round the main oven; and it may also be provided with one or more supplementary burners for heating it. One or more burners may also be arranged underneath detachable covers in the hotplate.

Dry Meters.—No. 273,492.

THORP, F., and PARKINSON & COWAN (GAS METERS), LTD., both of Kennington Road, S.E. 11.

No. 16,935; July 6, 1926.

This invention has for its object to provide an improved construction enabling dry gas meters to be readily assembled and dismantled for repair or inspection purposes, without the employment of skilled labour, and giving a large delivery capacity with a meter of small size.

The single claim is as follows: In combination, a central part having formed therewith a division wall common to both gas metering chambers, cover plates for the said chambers adapted to be detachably secured to said central part and with the edges of the diaphragms clamped between the said central part and cover plates to provide gas-tight packings, the top of the said central part having passages therein leading to the gas ports for the valves, a detachable cover on said central part forming a gas chamber, and means whereby each diaphragm directly operates a valve controlling the gas passages of the other diaphragm chamber, the operating mechanisms being connected to a common counter mechanism, whereby synchronization of movements is ensured, the operating means between the valves and diaphragms being such as to prevent or minimize any tendency to tilt or lift.

Distillation of Carbonaceous Materials.—No. 273,528.

SALERMO, LTD., of Kingsway, W.C. 1, and SALERNI, E. M., of Paris.

No. 22,791; Sept. 15, 1926.

This invention provides for a method of distillation which comprises crushing the material into small pieces; moving the crushed material in a thin layer and in a continuous manner over a flat metal plate or plates in a drying chamber in countercurrent to the waste gases used for distillation purposes; passing the material from the drying chamber through a seal into an externally heated distillation chamber wherein the material, while subjected to a progressively increasing temperature, passes laterally through a series of open-topped troughs arranged side by side, and wherein it is stirred and agitated so that agglomeration is prevented and the material behaves like an emulsion or fluid; discharging the spent solid material from the distillation chamber; withdrawing from the distillation chamber the volatile constituents yielded up during the heat treatment, and passing them, while still hot, through a dust extractor on their way to condensing means. The troughs may be located under a common roof (the latter being preferably composed of refractory material), and each trough contains a combined rotary stirrer and scraper. The red-hot coke from the distillation chamber may be passed directly and in a continuous manner from the distillation chamber through a gastight seal to the furnace of a steam generator boiler, or other heating apparatus, or it may be passed through a gastight seal into a coke cooling chamber.

The combustion chamber is preferably divided from the distillation chamber by a layer of refractory material, such as a series of brickwork arches; an opening being provided at one end of the roof of the combustion chamber through which the hot gases enter a passage located beneath the bottom of the troughs in the distillation chamber and the top of the combustion chamber. Through this passage the hot gases flow in the opposite direction to the material in the distillation chamber, and enter a passage leading to the drying chamber. The spent material may pass directly and continuously from the distillation chamber through a gas-tight seal into a coke cooling chamber within which the material is moved in a thin layer or layers over a flat metal plate or plates and is subjected to the influence of a cooling medium.

These and other features of the invention are explained in detail with reference to drawings.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 4.]

Nos. 19,621—20,294.

ADAMS, J. W.—"Centrifugal liquid purifiers." No. 19,885.
ANDERSON, J. H.—"Distilling carbonaceous material." No. 19,687.
ATKINSON, W. R.—"Clip to prevent accidental turning on of gas taps." No. 20,234.
BATES, A.—"Manufacture of electric and gas radiators." No. 19,779.
CATTON, R. P.—See Atkinson, W. R. No. 20,234.
CURRAH, J. C.—"Gas or electric heating apparatus." No. 20,024.
PORTER, W. J. H.—"Making joints and connections." No. 20,281.
TINNERMAN, A. H.—"Manifold cover for gas ranges." No. 19,840.
WILLIS & BATES.—See Bates, A. No. 19,779.

PARLIAMENTARY INTELLIGENCE.

SOUTH STAFFORDSHIRE MOND GAS BILL.

The New Products Clause—Special Report by the Unopposed Bills Committee.

As reported on p. 225 of the "JOURNAL" for July 27, the Unopposed Committee of the House of Commons on July 15, at their second consideration of the South Staffordshire Mond Gas Company's Bill, found considerable difficulty in making up their mind regarding clause 17, which proposed to give the Company power to manufacture and store, on scheduled lands, and to supply, sell, and deal in oxygen, hydrogen, nitrogen, carbon dioxide, carbon monoxide, methane, ethylene, acetylene, sulphuric acid, hydrochloric acid, nitric acid, and acetic acid.

At the conclusion of the hearing on July 15, the Committee left it to the promoters to decide which course to pursue—viz., to withdraw clause 17 and allow the Bill to be reported for third reading without it, or to hold the Bill over until the autumn session, the Unopposed Committee meantime making a special report upon the Bill. As the Company were extremely anxious to secure the other powers in the Bill, which the Unopposed Committee were prepared to pass, and as there might have been some chance of the whole Bill being lost if it were held-up for the autumn session, it was decided to adopt the first alternative. Thus the Bill was ordered to be reported for third reading without clause 17, and since then has received the Royal Assent.

The Unopposed Committee of the House of Commons, however, made the following special report upon the Bill:

> Section 17 of the Bill as laid before the Committee contained important powers to manufacture gases which have not hitherto been granted by Private Bill. It was stated to the Committee by a representative of the Board of Trade that the effect of the section, if it was passed, might be to encourage the production of gases and chemical compounds which are manufactured in Germany and America, but are not manufactured in this country to any considerable extent.
>
> The question raised is an important one; but the advisability of granting these powers by Statute, and the effect which the grant of them would have upon non-statutory chemical manufacturers and upon the chemical industry, have not been inquired into by the Department; and the Committee upon Unopposed Bills have no powers which would enable such an inquiry to be effectively conducted.
>
> Your Committee, therefore, decided not to take the responsibility of allowing the section to proceed; but they are unanimously of opinion that the matter is of such importance that an inquiry should be instituted before a Committee properly equipped for the purpose.

MISCELLANEOUS NEWS.

AN ELECTRICAL FAULT AND AN EXPLOSION AT ACTON.

In the issues of the "JOURNAL" for June 22 and 29 last, there appeared a report of an inquiry held at the instance of the Electricity Commissioners into an explosion which occurred at Beaconsfield Road, Acton, and which resulted in destruction of property and loss of life, on Feb. 19, at a time when a fault was discovered in the electrical distribution system at that point. The inquiry was held by Mr. G. Scott Ram, M.I.E.E., and Dr. J. S. Haldane, F.R.S., who were appointed by the Electricity Commissioners to report upon the matter under the provisions of the Electricity (Supply) Acts, 1882 to 1920. At the conclusion of the hearing, the tribunal indicated that they would report to the Electricity Commissioners in due course.

The following statement on the subject appeared in "The Times" on Monday last:

BITUMEN FUMES DUE TO SHORT CIRCUIT.

The two Inspectors who were appointed to hold a public inquiry into the explosion, which on Feb. 19 wrecked a shop at Acton and killed a woman, have come to the conclusion that it was caused by fumes from a casing of bitumen, melted by a short circuit of the electric cables laid in it.

There was no evidence, the Inspectors state in their report to the Electricity Commissioners, that the explosion was due to coal gas. At 3.45 a.m. on the day of the explosion, there was a bad short circuit on the electric feeder which passed down Beaconsfield Road; and investigation outside the shop No. 1, Beaconsfield Road after the explosion showed that the cables of the feeder, together with the bitumen casing, had been destroyed for about 18 in. Thirteen feet of the cable had been melted and fused; and it was evident that the gas produced by the short circuit had forced out the clay plugs of the pipe carrying the wires to the shop, and this allowed the gas to enter the shop.

Prof. R. V. Wheeler, of Sheffield University, estimated that the gas produced would have been more than sufficient to fill the whole shop with a highly-explosive mixture of gas and air. The Acton explosion seemed to show that ignition did actually occur in the absence of any of the ordinary sources of ignition.

The feeder laid in bitumen was not laid by the Metropolitan Electric Supply Company; and it was the only one of its kind left in Acton. All serious explosions as a consequence of short circuits of mains had occurred with mains laid in bitumen and with direct current. With the completion of the work of substitution, now in hand, the possibility of any further explosion from this cause in Acton would have been removed.

The Inspectors emphasize that services should be taken into houses in such a manner that gas cannot enter, and state that the practice of not giving the station attendant discretion to switch-off in the case of a heavy fault in bitumen mains before obtaining instructions is not satisfactory.

GLASGOW GAS PRICE.

A Substantial Reduction.

The Glasgow Corporation Gas Committee last week decided to recommend a substantial reduction in the price of gas, to operate from Sept. 12. The new rate is to be 4s. 3·7d. per 1000 c.ft., representing a reduction of 10·3d. on the present price of 5s. 2d. Following, as it did, upon an announcement that the coal strike had been responsible for a deficit of £946,336 on the past year's working, this proposal of the Committee came as a pleasant surprise to the consumers. Referring to the matter, the "Glasgow Herald" says: From consideration of the budget, the Committee found that the ordinary expenses of the Department can be covered in the ensuing year by the produce of a rate of 3s. 2d. per 1000 c.ft. The surplus yield of the higher rate of 4s. 3d. is to be devoted to wiping-out the large deficit accruing from the strike period.

After the meeting of the Committee, the following official statement was made, explaining the position:

The Committee had under consideration the Department's estimates of expenditure and revenue for the financial year. The figures submitted were sufficiently favourable to justify a decrease of 11d. per 1000 c.ft. in the price of gas, as and from the reading of meters during the quarter commencing on Sept. 12. The Committee, after discussion, decided to revert to the maximum allowed by Statute previous to the Special Order of November, 1926—viz., 11d. per therm, or 4s. 3·7d. per 1000 c.ft.

The Special Order gave the Corporation powers to charge a rate not exceeding 5s. 2d. per 1000 c.ft. up to Dec. 31, 1927; but the Committee have, in order to encourage the use of gas, decided to terminate the special price as and when each consumer concludes three quarterly periods at the higher rate. This arrangement ensures that no consumer, whether early or late in receiving his gas bill, will pay for more than nine months' consumption of gas at the special rate allowed by the Board of Trade.

The budget presented demonstrates that the Department could make ends meet next year with an average rate per 1000 c.ft. of 3s. 2d. The cost of manufacture and distribution, including service charges, is 1s. 8d. per 1000 c.ft.; the remaining 1s. 6d. being standing charges—such as sinking fund, interest on capital, rents, rates, Imperial and local taxation, and depreciation fund. All revenue accruing to the Department over a rate of 3s. 2d. per 1000 c.ft. is to be applied to wiping-out the deficit incurred by the coal stoppage of last year.

THE ACCOUNTS.

Turning to the accounts of the Department for the year ended May 31, the Committee on Gas Supply report that the gross revenue amounts to £2,289,738 and the gross expenditure to £2,753,818, which, with an added depreciation written off capital assets of £194,847, is equal to £2,948,665. The debit is £658,926; and to that figure has to be added annuities on stock, £17,594; interest on borrowed money, £136,847; and sinking fund, £132,968—leaving a deficit on the year's operations of £946,336, or £786,215 more than the previous year.

The revenue has increased by £450,725, due partly to the higher price of gas, which is made up from the following: Gas at 3s. 2d., £498,421; at 3s. 3d., £545,767; and at 5s. 2d., £698,365—making a total of £1,742,553, against last year's revenue from the same source of £1,436,792, or an increase of £305,761—and a more favourable return from coke and liquid residuals, &c., amounting to £144,964. The additional expenditure, as compared with the previous year, is largely due to the abnormal price of coal and extra labour.

Owing to the additional capital expenditure, there is an increase under the heading of depreciation of £13,763; and, for a similar reason, and the extra borrowing on temporary loan to meet the expenditure referred to, the interest and sinking fund charges have increased by £28,430.

Against these increases in expenditure, the cost of repairing gas heating and cooking appliances has fallen from £122,059 to £43,866, or a reduction of £78,193, due to the suspension of labour occasioned by the coal stoppage. The rents, rates, and taxes item is slightly greater, and is wholly due to the increased valuation and rates.

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDER.

Wokingham Corporation.

To authorize the Corporation to acquire and utilize for gas purposes scheduled lands; to borrow money; and to make further provisions with regard to the supply of gas.

CHEAP GAS.

Further Instances.

Several gas undertakings have recently reduced their prices to remarkably low figures. As mentioned in the "JOURNAL" for Aug. 3, the new charge at Middlesbrough is 2s. 2d. per 1000 c.ft. Concerning this, the "North-Eastern Daily Gazette" stated that at this price the borough can claim to supply the cheapest gas in the country. However, in our correspondence columns this week, Mr. H. Curtis, the Engineer and Manager of the Macclesfield Corporation Gas-Works, details the new charges there, which range from 6d. to 4d. per therm.

At Kirkintilloch, the flat-rate charges are: For power, 1s. 11d. per 1000 c.ft.; for ordinary consumers, 2s. 1d.; and for prepayment users, 2s. 2d. Sheffield supplies gas at 2s. 2d. for excess beyond 500,000 c.ft.; at 2s. 1d. for excess beyond 3,000,000 c.ft.; and at 1s. 4d. for excess beyond 6,000,000 c.ft. Kirkintilloch also has a sliding-scale, as follows:

			s.	d.	
Excess over	100,000 c.ft.	. . . .	2	0	per 1000 c.ft.
,, ,,	200,000 ,,	. . . .	1	11	,,
,, ,,	300,000 ,,	. . . .	1	10	,,
,, ,,	500,000 ,,	. . . .	1	9	,,
,, ,,	750,000 ,,	. . . .	1	8	,,
,, ,,	1,000,000 ,,	. . . .	1	7	,,
,, ,,	1,500,000 ,,	. . . .	1	6	,,

For power consumers, the rate is reduced in each stage by 2d. per 1000 c.ft., making the lowest rate 1s. 4d. per 1000 c.ft.

The Helensburgh Corporation undertaking claims to supply gas at the second lowest rate in Scotland; the charge being 2s. 1d. per 1000 c.ft.

Ballymena Gas-Works Position.—The Ballymena Council's decision, at a special meeting, in favour of a change of management was severely criticized at the last meeting of the Council by Mr. T. Kerr, J.P., who was absent in England at the time the decision was come to. He held that the Auditor's report on the gas-works should have been published. They had had deficits for some years; but in 1925 there was a surplus of £1703, though in 1926 there was a loss of £177. Had it not been for the coal strike, there would have been a surplus shown for this year. If they asked the average ratepayer in Ballymena where the money had been lost, he would tell them that it was lost through the coal strike, and not a penny piece of it was lost by their present Manager. The motion for adopting the minutes was carried by 6 votes to 5. The resignation of the Manager was then presented to the meeting; and Mr. Kerr, in moving that it be not accepted, said the Manager had not had fair play. It was decided, by 7 votes to 5 that the resignation be accepted.

PARKINSON AND W. & B. COWAN, LTD.

Annual General Meeting.

The Twenty-Seventh Annual Meeting of Messrs. Parkinson and W. & B. Cowan, Ltd., was held on Thursday, July 7, at the Company's Office, Fitzalan Street Works, Kennington Road, S.E.

Sir HENRY COWAN, M.P., Chairman of the Company, who presided, said he mentioned at their last meeting that there had been very keen competition in the home gas meter business, resulting in two of their Subsidiaries engaged in that business making considerable losses. Since June, 1926, however, matters had improved, and they had been obtaining better prices, with the result that the losses shown in the accounts of these Subsidiaries last year had been considerably reduced. They had good reason to hope that during the current year they would be able not only to wipe off the balance of those losses, but to realize a reasonable profit. It was due to the fact that they were now a Holding Company owning or controlling something like a dozen Subsidiary Companies that they were able to recommend a larger dividend; and it was because their various Subsidiaries were engaged in a variety of different businesses that they were able to rely upon a fair average return from one source or another, even at a time when what was once their staple industry was making no contribution to profits.

Turning to the Subsidiaries generally, the view of the Directors was that these were in a healthy condition. They had contributed approximately £16,000 more profit than in the previous year while retaining substantial undivided profits in order to maintain their stability. With regard to the Subsidiary and Associated Companies engaged on the electrical side of the business, these had contributed materially to the dividend fund.

The balance of profit and loss account, £72,565, was £23,194 more than it was in the previous year. They were recommending an increase of 2 p.ct. in the dividend. They paid on a much smaller capital some years ago a dividend of 10 p.ct. They were now recommending a dividend of 10 p.ct. on a very much larger capital; and he thought these facts spoke for themselves.

On the motion of the CHAIRMAN, seconded by Mr. A. NORTON, it was unanimously resolved: "That there be paid this day a final dividend on ordinary shares of 7½ p.ct., less income-tax—making, with the interim dividend, a total dividend for the year of 10 p.ct., less income-tax; that there be carried to reserve fund £17,385; and that there be carried forward to next account £26,627."

The CHAIRMAN remarked that last year they carried forward £28,608, and this year they were carrying forward £26,627, approximately only £2000 less, after increasing their dividend and making a large contribution to reserve. In this connection, the £28,608 which they carried forward last year was rather more than sufficient to pay the final 7½ p.ct. dividend.

INSTITUTION OF CHEMICAL ENGINEERS.

Examination Questions for Associate-Membership.

From Prof. J. W. Hinchley, the Hon. Secretary of the Institution of Chemical Engineers, we have received a copy of the papers for the Associate-Membership Examination of the Institution this year. As previously, a *viva voce* examination took place. This was held at the Chemical Industry Club, after the candidates had been entertained at dinner.

To give our readers some idea of the questions set in the written examinations, the following have been selected:

1.—(*a*) A magma containing water, ammonium sulphate, and sulphuric acid, has to be treated in a centrifuge. The sulphuric acid content of this magma is 4 p.ct.; what metal would you recommend for the construction of the centrifugal basket?

(*b*) Assuming the sulphate of ammonia collected in the centrifugal basket had to be treated with a weak solution of ammonium carbonate as a neutralizing medium, would you still continue to use the metal recommended for (*a*)? If not, what metal would you suggest?

(*c*) Describe in detail the experiments which you would conduct in each case on the metals in order to support your recommendation.

2.—Blue water gas is being used by a submerged flame process for the elimination of water from activated sludge, the original water content of which is 40 p.ct. Five hundred tons of dried product, with a 5 p.ct. water content, are being produced per day. For every 1000 lbs. of activated sludge evaporated, 2000 c.ft. of gas are used, and 350 lbs. of steam at 90 lbs. absolute pressure are available. What quantity of such steam would you set apart for the generation of blue water gas, for the "run," and how would you propose to utilize the balance of the steam, assuming a large factory existed and electrical energy and light were required? Give an indication of the cost of electricity per Board of Trade Unit, assuming the surplus steam was charged to the electrical plant at 6d. per ton.

3.—Ammoniacal liquor, as produced at many gas-works, can only be disposed of at pecuniary loss. From your knowledge of the methods by which ammonia is recovered at the present time at gas-works, can you suggest any alteration or modification of existing practice which is calculated to assist gas undertakings to dispose of their ammoniacal liquor at a profit?

4.—State what methods you would adopt for measuring the quantity of fluid passing in the following cases:

(*a*) 2000 c.ft. of air per minute at 15° C. and 760 mm. passing through a 6 in. diameter pipe.

(*b*) 20,000 c.ft. of air per minute at 50° C. and 760 mm. passing through a 6 in. diameter pipe.

(*c*) 25,000 galls. of water per hour passing through a 6 in. diameter pipe. The pipe is already assembled and cannot be dismantled.

(*d*) 5000 galls. of water per hour passing through a 3 in. diameter pipe which is not yet assembled.

(*e*) 4000 galls. per hour of an oil (specific gravity 0·9, and viscosity 100 relative to water) passing through a 4 in. diameter pipe.

(*f*) 15,000 galls. per hour of a liquid (specific gravity 1, and viscosity 1·2 relative to water) passing through a 5 in. diameter pipe. The power loss due to the flowmeter is not to exceed ¼ H.P.

(*g*) 1200 galls. per hour of cooling water required for a condenser.

5.—Calculate the heat loss from the curved surface of a rectifying column of a still. Air temperature 15° C.; temperature of the column 62° C. at top and 96° C. at bottom. Diameter of column 50 cm.; height 5 metres; material copper.

6.—Design a cooler for mixed gases containing 50 p.ct. steam at normal pressure and 50 p.ct. non-condensable gas. The temperature of the mixed gases is 100° C., and it is necessary to cool to 20° C. 50,000 c.ft. of the mixed gases are to be dealt with per hour. Ample cooling water is available at 15° C.

7.—Discuss any laws relating to the power required for the size reduction of material, and state on what assumptions they are based.

Describe either a jaw crusher, gyratory crusher, or disc crusher, indicating the materials used for the jaws and their method of fixing. Compare the advantages and disadvantages of each type of machine.

8.—What plant would you recommend for the production of 20 tons of ammonium sulphate per day from a 30 p.ct. solution of $(NH_4)_2SO_4$, (*a*) containing 2 p.ct. of H_2SO_4, and (*b*) a neutral solution? Calculate the heat requirements and give a sketch indicating any essential accessory plant.

9.—Describe, with sketches, giving the principles of operation, the type of plant which you would recommend for the combined production of a "smokeless" solid fuel and a gas of high calorific value.

10.—Write a short essay on the use of paint as a protection for iron or steel. State briefly the composition of paints used for this purpose.

11.—What are the chief factors which influence the choice of prime movers for electric generators? The following results were obtained during a test on a gas engine driving a dynamo:

No. of strokes per min.	98.
Mean effective pressure	59·4 lbs. per sq. in.
Area of cross-section of cylinder	44 sq. in.
Length of stroke	15 in.
Average gas consumed	2·3 c.ft. per min.
Mean temperature of gas at meter	13° C.
" pressure " " "	3·8 in. water gauge.
Barometer reading	29·2 in. of mercury.
Average water to cooling jackets	8 lbs. per min.
" temperature of cooling water at inlet	19° C.
" " " " " outlet	48° C.
Calorific value of gas	490 B.Th.U. per c.ft. at 0° C. and 760 mm.
Average output of dynamo	Volts, 220. Amperes, 20·5.
Loss of power in engine friction	20 p.ct.
" " " " belt drive	½ H.P.

Prepare a report on the performance of the gas engine and the dynamo. What is the over-all efficiency of the plant?

12.—Six million c.ft. per day of coke oven gas are available ten miles from a city. (*a*) How would you suggest disposing of this gas? (*b*) What arrangement would you make? (*c*) How would you propose to ensure continuity of supplies? In whatever form you recommend the gas should be used, indicate the kind of distribution system you would provide.

13.—Discuss the effect on the composition of the gas from a producer supplied originally with air of:

(*a*) Admitting steam with the air blast.

(*b*) Reducing the depth of the fuel bed.

SUMMER OUTING OF THE WELSBACH LIGHT COMPANY.

On Saturday last the annual summer outing of the Head Office Staff of the Welsbach Light Company, Ltd., took place, and resulted in an extremely enjoyable day. The party, numbering over 100, left Welsbach House at 9.20 by chars-a-bancs for Taplow. Arrived there, they had lunch, and then adjourned to the sports ground, where a splendid afternoon's sport was witnessed. Many of the races arranged for both men and ladies were keenly contested; and the finals produced particularly exciting finishes—a testimony to the care exercised in handicapping.

At 5.30 tea was served, and immediately afterwards the numerous and handsome prizes were graciously presented to the fortunate winners by Mrs. H. Talbot, the wife of the popular General Manager. Speeches were not the order of the day, but before departing Mr. Talbot addressed a few remarks to the company, saying that the day had undoubtedly been the best of the many enjoyable outings held by the Welsbach Company. He welcomed these opportunities for the whole of his staff to meet together in such sociability, and felt sure that they tended to cement the good feeling and harmony which were features of the routine of everyday life in Welsbach House. Mr. Talbot also read a telegram received from the Chairman of the Company, Mr. J. R. Yates, wishing the party a very happy day. After a vote of thanks to Mrs. Talbot for presenting the prizes, the General Manager said that before they parted he felt all present would agree with him that their heartiest thanks were due to Mr. W. Gower, the Manager of the Order Department, and Mr. R. Tempany, the Manager of the Electrical Department, as well as the rest of the Committee, for the wonderful arrangements made to ensure success. Leaving Taplow at 8.45, the party arrived back at Welsbach House at 10.30, unanimous in proclaiming the day a high success.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The improved tone of recent weeks has been maintained. As is usual, the better quality coals have been the first to benefit; but there are too many weak collieries at present for any general effect to be felt. As it is, some of the best makes both of gas and steams have been able to book up a few orders at 3d. to 6d. more than has been obtainable for some considerable time; and this, together with the circulation of a good volume of inquiry, is giving rise to hopes of better things.

Quotations, while showing no appreciable change, are more in keeping with actual values obtainable in the market. Wear Special gas makes quote 16s. 6d. f.o.b., and best qualities ask 16s. to 16s. 3d. Second-class gas makes quote 13s. 9d. to 14s. 6d., and are slightly firmer than recently, though there are still a good many weak turns to be filled before any advance can be expected. Coking coals are still a weak market, and in poor demand round 14s. Durham unscreened bunkers have been distinctly better for superior brands, which have been able to get business up to 14s. 9d. f.o.b., against recent prices of only 14s. 3d. Northumberland screened steams are quoting 14s. 3d. to 14s. 6d. for best sorts. Gas coke is steady, and 21s. f.o.b. is the price quoted for shipment.

YORKSHIRE AND LANCASHIRE.

The seasonal holidays have naturally interfered this week with the usual trend of business, and many collieries are taking advantage by working shorter time than customary. The demand for house coal is retarded, without any alteration in prices. Industries are unsettled by local holidays, and there is not a very keen request for steam fuels, even at low figures.

The present time is very opportune for putting into stock, and making the best use of facilities for obtaining cheap fuel, although a very small percentage of consumers adopt this policy. Gas coals continue to be fixed at low prices over the next twelve months, and some concerns are even buying for a longer period. Lack of export orders is proving to the benefit of gas-works, and those concerned naturally take advantage of this position.

Humber bunker and export prices, f.o.b. usual shipping ports, are as follows: South Yorkshire—Hards, Association, 16s. to 16s. 3d. per ton; screened gas coal, 15s. 6d. to 16s.; washed trebles, 17s. to 18s.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. 6d. to 15s. 9d.; washed smalls, 12s. 3d. to 12s. 6d.; rough slack, 10s. to 10s. 6d.; and smithy peas, 17s. 3d. to 18s. West Yorkshire—Hartleys, f.o.b. Goole, 14s. 6d. to 15s.; screened gas coal, 15s. to 15s. 9d.; washed trebles, 16s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s.; washed smalls, 12s. to 12s. 6d.; unwashed trebles, 15s. to 15s. 6d.; unwashed doubles, 13s. 6d. to 14s.; and coking smalls, 11s. to 11s. 3d. Derbyshire and Nottinghamshire—Top hards, 17s. to 18s. 6d.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. 3d. to 15s. 9d.; washed smalls, 12s. to 12s. 6d.; and rough slack, 11s. to 11s. 6d. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. to 14s. 6d.; gas coke, 19s. to 21s.; and furnace coke, 19s.

MIDLANDS.

It is scarcely possible to diagnose the position of the coal trade this week. The collieries in Canrock and Warwickshire were idle until Wednesday, and in some cases Thursday; and as factories and industrial establishments generally throughout the district were on holiday, demand was dormant. Distributors in Birmingham had deliveries coming through on Thursday for which there was no outlet, and trade will not be normal until about the middle of the current week. Owners would like to find a larger market for slacks of all kinds, and would sell nutty qualities at from 8s. to 10s. D.S. nuts and beans are also easy at from 12s. to 14s., and 15s. in some cases for the best qualities. The house trade is dead for the time being; but a revival all round is looked for after the holidays, as it has become generally recognized that current rates are as low as they are likely to be, and that the next move will be upward. The lengthening nights will soon tell on the call for gas and lighting fuel generally, apart from the larger quantities that will be required for industrial purposes as the expected autumn trade revival develops.

Public Lighting in Liverpool.

In the report of the City Lighting Engineer (Mr. H. Dickinson, M.Inst.C.E.) on the working of the Lighting Department for the year 1926-27, it is stated that, despite the extension of electric lighting, the number of gas burners shows very little diminution. This is largely due to the substitution of 4-light and 2-light lamps in lieu of 2-light and 1-light respectively. The number of electric lamps lighted at the end of the year was 6325, and the number of gas lamps 24,804. The gas meter testing branch of the Department's work continues to grow; the number of meters tested having increased from 38,324, which was a record, to 39,921, and the fees from £2218 to £2262. The gross expenditure of the Department for the twelve months amounted to £120,247, and a revenue of £16,001 has been derived, principally for work performed for, and material supplied to, other departments and bodies, making the net expenditure on public lighting £104,245, representing a rate of approximately 4·16d. in the pound.

Reduction at Elland.—The Elland-cum-Greetland Gas Company announce a reduction in the price of gas, from the September quarter meter readings, equal to 4½d. per 1000 c.ft. There was a similar reduction last March.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 8.

There is a fair amount of inquiry for pitch, and business is possible to-day at 90s. to 92s. 6d. per ton f.o.b. makers' works.

Creosote is firm at about 8¼d. per gallon in bulk.

Pure toluole is in demand, and somewhat scarce, at about 2s. per gallon. Pure benzole is 1s. 6d. to 1s. 7d. per gallon, and 95/160 solvent naphtha about 1s. 5d. per gallon.

Tar Products in the Provinces.

Aug. 8.

Markets for tar products generally have been quite firm during the past week.

In pitch, owing to important Continental inquiry, the market, after being quieter for a day or two, has again advanced, and it is reported that 90s. has been paid on both the east and west coasts for delivery to March next. Inquiry from South Wales continues good, although makers appear only willing to purchase for near delivery.

Creosote remains steady.

Water-white products are still dull.

Tar acids generally are firm with a big demand.

Naphthalene and anthracene are quiet.

The average values of gas-works products during the week were: Gas-works tar, 63s. 9d. to 68s. 9d. Pitch—East Coast, 88s. 9d. to 91s. 3d. f.o.b. West Coast—Manchester, 83s. 9d. to 86s. 3d.; Liverpool, 86s. 3d. to 88s. 9d.; Clyde, 87s. 9d. to 90s. 3d. Benzole, 90 p.ct., North, 1s. 2d. to 1s. 3d.; crude, 65 p.ct. at 120° C., 10¼d. to 10½d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 10½d. to 11¼d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 7¼d. to 7½d.; salty, 7d. to 7¼d.; Scotland, 7¼d. to 7½d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4½d. to 2s. 5d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

Davey-Paxman "Economic" Boilers.

We understand that Messrs. Davey, Paxman, & Co., Ltd., of Colchester, are installing one of their "Economic" boilers in the gas-works of the County Borough of Burnley; and also that they have recently received an order for a further large-size "Economic" boiler of their make from the Colchester Gas Company.

A Welsbach Prize Advertisement.

In connection with an Advertisement Judging Competition recently promoted by the "Hardwareman and Ironmongers' Chronicle," the advertisement of the Welsbach Light Company, Ltd., entitled "Eclipsed," which appeared in our issue for June 22, was placed first in the order of merit. The designer of the advertisement was Mr. Reginald H. Palmer (of Palmer's Publicity Service), who was awarded a prize of five guineas.

"Revergen" Gas Furnaces.

The "Revergen" principle of furnace-firing by town gas has met with remarkable success; and information comes to hand that one of the big railway companies have recently ordered, for installation at their works, from the Davis Furnace Company, three "Revergen" triple chamber spring heating furnaces, and one "Revergen" coil heating furnace, with the necessary blowing and temperature recording plant—the whole contract amounting to over £2800.

Installation and Working of Waste-Heat Boilers.

An interesting booklet on this subject has been published by Messrs. Joseph Adamson & Co., of Hyde. In this they state that correct installation is a point which vitally affects the success of a waste-heat boiler plant. In forming the various connecting flues, due regard must be paid to the laws governing the flow of gases, in order to provide the path of least resistance for them. If this matter is not carefully watched, and inefficient flue work is provided, then the power to drive the induced draught fan is more than is necessary, and is a perpetual dead charge against the plant. Given a correct installation, it is stated, the only points which require attention in an Adamson plant are tube cleaning and oiling the moving parts of the fan. The feed water is automatically controlled by a patent regulator of marine pattern, which will maintain a constant water level under widely varying load conditions.

CONTRACTS OPEN.

Coal.

The Sidmouth Urban District Council are inviting tenders for the supply of gas coal. [See advert. on p. 348.]

Cupar's Lowest Gas Price.—The intimation that the price of gas in Cupar was to be reduced to 3s. 10d. per 1000 c.ft., the lowest it has ever been, was made at the annual meeting of the Cupar Gas Company. Moving the adoption of the report, Hon. Sheriff Stark, the Chairman, said a profit of £1510 was shown on the year's working. Last year's figures for the purchase of coal showed an increase of £2800 over that of the previous year, caused by the strike. The large increase of 2 million c.ft. in the amount of gas sold was encouraging. The report, which declared a dividend of 7½ p.ct. on the ordinary stock and 5 p.ct. on the preference stock, was unanimously adopted.

Year's Working at Morecambe

The Chairman of the Morecambe Gas Committee, Councillor J. C. Wilson, in submitting to the Council the report of the gas undertaking for the year ended March 31, said that, in spite of the events of the past twelve months, the gas undertaking had come out on the right side. In anticipation of the possibility of the coal stoppage, the Engineer and Manager, Mr. T. W. Barrett, had accumulated what at that time appeared to be a very large amount of coal—nearly 3½ months' stock. When this was depleted, the best American coal was purchased. It was more expensive, but proved to be an excellent gas-making coal—in fact, better than many English coals. It was important to Morecambe, as a pleasure resort, to have a good supply of gas during the season; and it was unfortunate that the coal strike should have happened at the busiest period of the year. However, the normal supply, pressures, and value of the gas were maintained throughout. By judicious buying, only two weeks' stock of high-priced fuel was on hand at the end of the strike. The price of gas had been increased by 1d. per therm during the winter months, but they had now lowered the charge to the pre-strike figure. The expenditure on revenue account was £42,705 and the income £63,081, leaving a gross profit of £20,376. After deducting interest on loans, sinking fund, income-tax, &c., amounting to £18,946, there was a net profit of £1430. This item was carried to the reserve fund, which, with the addition of last year's profit, now stood at £4288. It was recommended that £4290 of this amount be applied to capital account. Councillor Wilson said he wished to pay tribute to the loyalty of the staff and to the ability of their Engineer and Manager, Mr. Barrett, who had so ably steered them through a trying year.

Reduction at Retford.—The Retford Town Council have decided to reduce the price of gas from 11d. to 9·1d. per therm (4s. 6d. to 3s. 11½d. per 1000 c.ft.) as from Oct. 1.

Reduction in Price at Ross.—The Ross Gas Company have decided to reduce the price of gas, after the meter readings on June 30, to ordinary consumers from 6s. to 5s. 6d. per 1000 c.ft., and for street lighting from 5s. 8d. to 5s. 2d. per 1000 c.ft.

Reading Gas Company's Capital Issue.—The issue of £30,660 of ordinary stock in the Reading Gas Company, which was recently advertised in the "JOURNAL," was largely over-subscribed; the price realized being well above the minimum at which the stock was offered.

Croydon Gas Company's Dividends.—The Directors of the Croydon Gas Company have declared the following dividends in respect of the half-year ended June 30: On £787,560 sliding-scale stock, at the rate of 6½ p.ct. per annum; on £403,100 maximum dividend stock, at the rate of 5 p.ct. per annum; and on £120,000 preference stock, at the rate of 7½ p.ct. per annum.

Standard Ammonia has been registered as a private company, with a nominal capital of £50,000, in £1 shares, to adopt an agreement with the Standard Ammonia Company and its Liquidator, and to carry on the business of wholesale and retail dealers in chemical substances of all kinds, chemical manufacturers and refiners, manufacturing chemists, artificial manure manufacturers and dealers, &c.

Extensions at Blackpool.—Sanction has been obtained by the Blackpool Corporation for the borrowing of £20,000 for a new gasholder; £900 for exhausters; £1800 for meters; £4485 for a coal and coke conveyor; £8815 for a waste-heat boiler; £1157 for coke bunkers and screen; £1500 for water-treatment plant; and £3450 for gas drying plant.

Airdrie Corporation Gas Department.—At a recent meeting of the Airdrie Town Council, the Engineer and Manager (Mr. Arch. Kellock) submitted his annual report on the working of the Gas Department for the year. Bailie Martyn, the Convener, intimated that the Gas Committee intended to reduce the price of gas, by 1s., to 4s. 5d. per 1000 c.ft., the pre-strike figure. During the past year the amount of gas made was 154,579,000 c.ft., compared with 146,625,000 c.ft.—an increase of 7,954,000 c.ft., or 5·42 p.ct. The quantity of gas sold was 144,868,300 c.ft., compared with 138,619,400 c.ft. for the preceding year—an increase of 6,248,900 c.ft., or 4·51 p.ct. Deducting the total expenditure under revenue account, amounting to £36,152, from the total income, amounting to £44,552, there was a surplus balance of £8400 to be carried to the credit of net revenue account to meet the annual standing charges. The amount at the credit of net revenue account being £8646 (which was inclusive of a credit balance of £246 brought forward from last year), and the total charges being £8336, a credit balance of £309 was carried forward to next year.

Administration at Belfast.—Interesting references are made to the Gas Department in a report of a Special Committee appointed by the Belfast Corporation to examine into the salaries, wages, and duties of all Corporation employees, and to make recommendations. The Committee express the highest admiration for the efficient management of Mr. J. D. Smith,; and so far as the salaries and wages of his technical staff are concerned, they would be content to leave matters in his hands. Mr. Smith is in thorough agreement with the Committee that the principle of the clerical grading scheme is bad. He always disapproved of this system, but was never consulted or given any opportunity of expressing his opinion. He thinks—and the Committee heartily agree with him—that a Department such as his, turning-over upwards of £1,000,000 per annum, should have been consulted before the present clerical system was brought into operation. It very greatly increases the expense of his Department, without in any way adding to its efficiency. A number of ways in which savings might be effected, in connection with the clerical work, &c., are indicated; the total economies outlined representing about £10,000 per annum.

Wirksworth Gas Cheaper.—The Wirksworth and District gas Light and Coke Company have given notice that from the current quarter there will be a reduction in the price of gas from 9s. 4d. to 7s. per 1000 c.ft.

Seaford Gas Company, Ltd.—The price of gas will be reduced, by 0·8d. per therm, as from the Midsummer readings, to 1s. 1·8d. per therm (equivalent to 5s. 9d. per 1000 c.ft.). This does not apply to gas used for engines.

Centenary of Gas at Doncaster.—The centenary of the Doncaster Corporation gas undertaking will occur in November; and it is intended to celebrate the occasion by a gas appliances exhibition at the Guild Hall, and by other functions.

Reduction in Price of Gas at Reading.—The Reading Gas Company announce that the price of gas has been reduced from the Midsummer meter readings by ⅛d. per therm. This reduction brings the price down to that ruling before the coal dispute last year—namely, 8⅜d. per therm.

Montrose Gas Dividend.—Mr. David Smith, Chairman of Directors of the Montrose Gas Light Company, Ltd., presided at the annual meeting. It was reported by the Chairman that the usual 10 p.ct. dividends would be given to the shareholders, and in addition a special 2½ p.ct. bonus, in view of the Company reaching its centenary.

Cleveland Gas Company.—The profit made by the Company during the half-year ended June 30 amounted to £1107; and adding the sum brought forward, there is a balance available of £4073. Out of this the Directors recommend the payment for the half-year of a dividend at the rate of 3 p.ct. per annum, less income-tax, which will leave £3475 to be carried forward.

West Bromwich Accounts.—The serious effect of the coal dispute on West Bromwich Corporation trading concerns is reflected in the report of the Gas Committee for the year ended March 31. The total income of the gas undertaking was £121,915, compared with £105,534 for the previous year. The gross profit amounted to £3755; and after payment of interest and sinking fund charges, there was a net loss of £5519, compared with a net profit of £3790 last year.

Good Working at Peterhead.—In his report on the working of the Peterhead gas undertaking for the year ended May 15, Mr. W. S. Easson, the Manager, states that the gas manufactured was 74,965,000 c.ft.—an increase of 9·35 p.ct. over the previous year. The year's working resulted in a deficit of £207, due to the coal strike. Bailie Nicol (Convener of the Gas Committee), when the report was submitted at a recent meeting of the Town Council, congratulated Mr. Easson and his staff on the way they had pulled the undertaking through a trying period. It was resolved that the price of gas should be reduced from 5s. 10d. to 5s. per 1000 c.ft., as from the date of the last reading of the meters.

Increased Output at Weymouth.—The Directors of the Weymouth Consumers' Gas Company, reporting upon the working for the half-year to June 30, state that the sales of gas again show a considerable increase; the amount sold during the six months having been 506,807·76 therms, or 110,175,600 c.ft. This, compared with the corresponding period of last year, shows an increase of 10,270,000 c.ft., or 10·28 p.ct. The receipts from the sale of gas exceed those of a year ago by £1968. After providing for the interest on the debenture stock, the balance at the credit of the net revenue account is £13,494; and out of this the Directors recommend the payment of a dividend on the ordinary stock for the half-year at the maximum rate of 5 p.ct. per annum, less income-tax.

Results at Bo'ness.—The Bo'ness Gas Light Company, Ltd., held their 31st annual meeting on July 25—Mr. D. K. Harrower, J.P., presiding—when it was agreed that a dividend of 8 p.ct., free of tax, be paid. The Directors, in their report, stated that the income for the year amounted to £12,162, and the expenditure, including allowance for depreciation, to £10,954, leaving a balance of profit for the year of £1207. This, with the sum brought from last year, £1011, made available for disposal the sum of £2218. The make of gas was 40,244,000 c.ft.—an increase for the year of 1,213,700 c.ft. The gas sold showed an increase of 2,683,100 c.ft. The Chairman intimated a reduction in the price of 5d. per 1000 c.ft. from the next survey, making the charge 4s. 2d.

Delayed Extensions at Omagh.—Giving evidence at the Ulster Home Office inquiry into an application by the Omagh Urban Council for a loan of £3000 for the improvement of the gas-works, Mr. P. J. O'Callaghan, the Manager, stated that seventeen years ago he got expert opinion on the subject of the purifiers in existence at the works, and was informed that they were only about half sufficient. Nothing had been done since then, and there were complaints from consumers. If improvements were carried out, the quality of the gas would be more satisfactory and the demand greater. The number of meters had been increased from 100 to 520 in the past seventeen years. Mr. R. J. Skinner, Consulting Engineer, said that he considered new purifiers were an absolute necessity.

Bristol Gas Company's Sports.—The seventh annual sports meeting of the Bristol Gas Company's Sports and Recreation Club, held on the ground at Stapleton Road on July 23, was successful in entertaining both the competitors and the spectators. The organization was of notable efficiency, and the programme was carried through with expedition which would have done credit to a big meeting. The prizes included two station trophies—the Sir George E. Davies trophy, for aggregate points, and the W. Windus trophy, for the inter-station relay race. Colston Street (Barton Street) won both, retaining the former and taking the latter from Avon Street. Mrs. Eberle, who attended with Alderman J. Fuller Eberle, distributed the prizes, and Mr. R. Robertson, President of the Club, expressed thanks to her and the Directors. Mr. Boucher replied.

Bristol's Gas.—The Gas Examiner's report on the gas of Bristol states that the average calorific value for the June quarter was 480·9 B.Th.U., while the declared value upon which customers are charged is 480 B.Th.U.

Cheaper Gas at Cambridge.—The Directors of the Cambridge University and Town Gas Light Company announce that all gas consumed from and after taking the readings of the meters for the quarter ended midsummer will be charged for at the rate of 8d. per therm (3s. 2d. per 1000 c.ft.).

Glastonbury Gas Department.—The statement of accounts for the year ended March 31 shows that the total expenditure was £16,404 and the total income £22,341. The balance carried to net revenue account was £5937. After payment of interest on loans, &c., the credit balance was £737.

Loss at Hebden Bridge.—The annual report of the Hebden Bridge and Mytholmroyd Gas Board shows a gross profit of £4833, but there is a net loss of £1440, compared with a net loss of £1820 in the previous year. The gas output was 125,385,000 c.ft., an increase of 6,310,000 c.ft., constituting a record for the undertaking.

Extensions at Plymouth.—It was reported at a meeting of the Plymouth Corporation Gas Committee, on July 21, that the Ministry of Health had sanctioned the borrowing of £26,530 for new retorts and stoking machines. The work is to be proceeded with at once; and it is hoped that the new plant will be installed in time to deal with the Christmas demand.

Public Lighting at Alsager.—The question of the public lighting of the streets was before the Alsager Urban Council recently, when two tenders—one from the North Wales Electricity Distribution Company, and the other from the Kidsgrove Gaslight Company—were submitted. The tender of the Electricity Company amounted to approximately £300, and that of the Gas Company to £222 per annum; and the latter was accepted.

New Scale of Charges at Todmorden.—At a recent meeting of the Todmorden Town Council, Alderman W. Greenwood (Chairman of the Gas Committee) said that, to increase consumption and thereby reduce overhead charges, the Committee had decided to introduce a new scale of charges as an alternative to the present one. Consumers would be supplied with gas at half-price, *plus* a fixed annual charge of 2½d. per sq.ft. of floor space in living and reception rooms. Such a system had given great satisfaction in certain other towns.

Grantham Gas Company.—An encouraging report as to the past six months' operations was presented at the 106th half-yearly meeting of the Grantham Gas Company, which was held under the Chairmanship of Mr. J. G. Thompson. The balance-sheet showed a profit of £6958, and a dividend of 5 p.ct., less income-tax, was declared on the consolidated stock, absorbing £1600. It was decided to transfer £1000 to the reserve fund, and to carry forward the balance. A reduction of 4d. per 1000 c.ft. is to be made in the charge to customers from Oct. 1 next.

Newcastle (Staffs.) Gas Undertaking.—At their meeting on July 27, the Newcastle Town Council considered the annual report of the Accountant-Auditor (Mr. J. C. Bladen) respecting the finances of the gas undertaking, and an account by the General Manager (Mr. F. M. Wimhurst) of the practical working. The year's operations resulted in a loss of £1293, compared with a profit in the previous year of £1582. The sales of gas showed an increase of 14·4 p.ct. Mr. E. M. Hollins (Chairman of the Gas Committee) drew attention to the fact that the price of gas was not raised during or after the coal strike.

Maidstone Gas Company.—The accounts for the year ended June 30 show that, after providing for all fixed charges (including £3800 for depreciation of stoves and fittings), there remains an available balance of £19,313; and the Directors recommend payment of a dividend at the rate of £8 10s. p.ct. for the year, in respect of which an interim dividend at the rate of 4 p.ct. was paid on March 1. The sales of gas show an increase of 85,270 therms, or 4·4 p.ct., over those of the previous year. The Directors have purchased a site for the erection of a new showroom in King Street, Maidstone. Work has already begun; and it is anticipated that the building will be ready for occupation this autumn.

Shipley Gas-Works Results.—The Shipley District Council gas undertaking, according to accounts submitted on July 26, shows a loss of £10,720 on the past year's working, due practically entirely to the high cost of coal as a consequence of the strike. There has been no increase in the price of gas; and it is not intended now to impose one, as the loss can be liquidated out of reserve.

Bridport Gas Company, Ltd.—A gratifying increase in the sale of gas is recorded by the Directors in their report; the amount sold in the year ended June 30 having reached 48 million c.ft., which represents an increase of nearly 2 million c.ft. over the previous year. The heavy extra charges occasioned by the coal strike were to some extent met by an increase in the price of gas (though this was for two quarters only); and the Directors consider that the general position is satisfactory. After placing £500 to the reserve fund and meeting the preference dividends, they recommend a dividend of 10 p.ct., less tax, on the ordinary shares. This will leave a balance of £1020 to be carried forward.

Results at Accrington.—Details of the year's operations of the Accrington and District Gas Board are given in the annual report of Mr. A. J. Harrison, the General Manager. There was a loss of £6695 on the undertaking. The total expenditure was £140,268, and the income £160,553, leaving a gross profit of £20,285. The expenditure showed an increase of £47,642, and in the income there was an increase of £33,109; but gas sales were greater by £17,800, coke sales by £10,762, and tar product sales by £4414. The net deficit was £6695, compared with a surplus of £1767 for the previous year. The deficit on net revenue account now stands at £14,241. The average price received for gas was 4s. 2·5d. per 1000 c.ft., against 3s. 9·2d. for the previous year. The estimated cost of the coal dispute to the Department was £43,500. The quantity of gas produced was 617,820,000 c.ft.—an increase of 26,920,000 c.ft. The gas accounted-for totalled 569,179,200 c.ft.—greater by 29,476,900 c.ft. The consumption of gas since 1919 has increased by 212 million c.ft., equal to 60 p.ct. The appliances sold through the showroom and fixed by the Board's staff constituted a record, including: Cookers, 903; fires and radiators, 356; wash-boilers, 601; geysers, 8; and grillers, 6—total, 1874. Mr. A. J. Harrison stated that, while the present rate charged for gas was a considerable handicap, it was not desirable to make any alteration during the present year, over which period it was hoped to clear the deficit standing against the net revenue account.

The Elie and Earlsferry Gas Company, Ltd., report a loss of £407 on the year's working, owing to the coal dispute.

The British Gas Light Company were awarded the second prize for the best tradesmen's four-wheeled turn-out in connection with the Cottingham Horse Show, on Aug. 1.

While engaged on a holder at the works of the Calverley Gas Company, near Leeds, Dan Parker fell, fracturing both legs and suffering abdominal injuries. He was detained at the Leeds Infirmary in a serious condition.

At the Dundee Sheriff Court a sentence of 40 days' imprisonment was imposed on William Kenny Mitchell, general dealer, for having broken open a gas meter in his house at 3, Brook Street, Dundee, and stolen from it 16s. 9d.

At the Dumbarton Police Court last week, when Mary M'Learie was put on probation for three months for having stolen 19s. from a gas meter in her house, it was pointed out that persons in accused's district had discovered how to open the padlocks with safety pins. Accused, who afterwards paid back the 19s., used a knitting needle for the purpose. It was stated that the police had about twenty cases of this kind reported this year.

Mr. J. B. Balmforth, Gas Engineer and Manager to the Bingley Urban District Council, and a well-known member of the Yorkshire Junior Gas Association, was the subject of a special interview, in the "Yorkshire Observer" of Aug. 4, on "The Future of Gas." Mr. Balmforth made out a very strong case for the use of gas to-day, as compared with rival heat agencies, and contended that, though the gas industry is so many years old, it is still in its infancy in regard to its possibilities in the public service.

WATER GAS PLANT.

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED.

36, Victoria Street, London, S.W.

STOCK MARKET REPORT.

THE fears that have prevailed for some time that the Bank Rate would rise to 5 p.ct. in the autumn have been allayed by the reduction in the Bank of New York re-discount rate from 4 to 3½ p.ct. The prospect of cheap money had an immediate effect on the prices of gilt-edged securities; but owing to the scarcity of stock, the business done was not large. The two Conversion Loans and 5 p.ct. War Loan were noticeably strong. The Foreign Market was quiet, but several of the new scrips were better in the absence of further new issues. Industrials were somewhat irregular; but Newspaper shares were the centre of attraction during the week. There was large buying of both Allied and Associated shares, and also Daily Mail, Daily Mirror, and Sunday Pictorial shares on rumours of bonus issues. On the other hand, Tobaccos and Artificial Silks were decidedly quieter.

In the Gas Market, in spite of the short week, transactions were normal; but it will be seen by the Table that there were only two changes in the quotations—South Metropolitan 6½ p.ct. debenture and Tynemouth Consolidated and New with a rise of 1 point each, the latter being at the local Exchange. The new 6 p.ct. preference stock of the South Metropolitan Company is now quoted on the Exchange at 109-112, and is included in the Table. It is anticipated that this stock will be very popular with investors. Among the dividend declarations of the week are the Croydon sliding-scale stock of 3½ p.ct. for the half-year, the Maidstone Company 8½ p.ct. for the year to June, and the Weymouth Company 5 p.ct. for the half-year. The offer by the Reading Gas Company of £30,660 ordinary stock at £85, ranking for a maximum dividend of 5 p.ct., was largely over-subscribed.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 5.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 10	5	5	Aldershot 5 p.c. max. C.	70—73	..	..
223,992	,,	,,	4	4	Do. 4 p.c. Pref.	68—71	..	..
1,851,888	,,	Apl. 7	6½	7	Alliance & Dublin Ord.	84—87	..	87 3/16—84½
274,000	,,	July 14	4	4	Do. 4 p.c. Deb.	64—67	..	..
522,554	,,	—	—	—	Barnet Ord. 7 p.c.	101—104	..	..
200,000	1	Apl. 28	1/7½	1/7½	Bombay, Ltd.	1—1½	..	..
170,000	10	Mar. 10	8½	8½	Bournemouth 5 p.c.	123—132	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	124—132	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—11½	..	..
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb.	54—57	..	55—56½
163,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
357,900	,,	—	—	—	Brighton & Hove 6 p.c. Con.	106—109	..	..
341,800	,,	—	—	—	Do. 5 p.c. Con.	94—97	..	..
1,327,800	,,	July 28	5	5	Bristol 5 p.c. max.	84—85a	..	..
885,000	,,	Mar. 24	8	7	British Ord.	108—111	..	..
100,000	,,	June 29	7	7	Do. 7 p.c. Pref.	112—117	..	..
130,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	73—78	..	75
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	94—96	..	..
100,000	10	May 26	6	8	Cape Town, Ltd.	7½—8½	..	..
100,000	10	Apl. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
695,880	,,	July 28	6	6	Cardiff Con. Ord.	97—100*	..	..
337,860	,,	June 29	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	,,	Feb. 24	5	6½	Chester 5 p.c. Ord.	86½—91½b	..	..
79,185	1	Apl. 28	†2/-	†2/-	Colombo Ltd. Ord.	29/—31/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
831,490	1	Apl. 7	1/03	1/03	Colonial Gas Assn. Ld. Ord	24/6—26/6	..	..
178,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
2,073,220	Stk.	July 14	—	5	Commercial Ord.	86½—88½	..	87—88
476,000	,,	June 16	3	3	Do 3 p.c. Deb.	56—59	..	57—57½
800,000	,,	Sept. 30	‡2	‡1	Continental Union, Ltd.	34—37	..	34½
280,000	,,	Mar. 10	7	7	Do. 7 p.c. Pref.	84—86	..	86
787,560	,,	Mar. 10	6½	6½	Croydon sliding scale	97—100	..	..
408,100	,,	,,	5	5	Do. max. div.	78—81	..	79½—80½
422,270	,,	Feb. 24	8	9	Derby Con.	104—106e	..	..
55,000	,,	June 29	4	4	Do. Deb.	73—76c	..	..
200,000	,,	Mar. 10	5	5	East Hull Ord. 5 p.c.	76—80	..	..
80,000	,,	June 16	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,009,180	10	Mar. 24	‡3	‡3	European, Ltd.	6½—6¾	..	6½—6¾
18,747,460	Stk.	July 28	5	5	Gas Light & Coke 4 p.c. Ord.	85—87*	..	86—86¾
2,800,000	,,	,,	3½	3½	Do. 3½ p.c. max.	59—61*	..	59½—60½
4,187,920	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74½—76½*	..	75½—76½
5,602,830	,,	June 16	3	3	Do. 3 p.c. Con. Deb.	58—60	..	58½—59½
181,815	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	100—103	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98—100	..	99½—99½
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 10	6½	6½	Hastings & St L. 5 p.c. Conv	90—92	..	..
288,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	67—72	..	..
70,000	10	Apl. 28	†10	†10	Hongkong & China, Ltd.	12—13	..	..
178,200	Stk.	Mar. 10	5	5	Hornsey Con. 3½ p.c.	67—69	..	..
1,976,000	,,	May 12	10	10	Imperial Continental Cap.	139—141	..	139—141
223,130	,,	Feb. 10	3½	3½	Do. 3½ p.c. Red. Deb.	69—71	..	..
295,342	,,	Mar. 10	6½	6½	Lea Bridge 5 p.c. Ord.	95—98	..	..
3,145,907	,,	Feb. 24	5½	5½	Liverpool 5 p.c. Ord.	85—86b	..	..
600,000	,,	Sept 30	7	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
185,786	,,	Feb. 24	9	8	Maidstone 5 p.c. Cap.	110—115	..	..
88,480	,,	June 16	3	3	Do. 3 p.c. Deb.	50—55	..	..
75,000	5	June 16	†7	†8	Malta & Mediterranean	5—5½	..	..
541,920	Stk.	May 26	†5	†7	Montevideo, Ltd.	90—92	..	91½—92
2,061,815	,,	July 28	5	5	Newcastle & Gateshead Con.	73—74d*	..	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	66½—67½d*	..	..
691,705	,,	June 29	3½	3½	Do. 3½ p.c. Deb.	66½—67½d	..	..
131,785	,,	—	—	—	North Middlesex 6 p.c. Con.	c91—98	..	..
800,000	,,	Apl. 28	9	7	Oriental, Ltd.	100—102	..	..
188,120	,,	June 29	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Feb. 24	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	102—105	..	..
286,732	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	77—78
2,389,909	1	—	—	—	Primitiva Ord.	17/—18/-	..	17/—17/6
282,200	100	June 1	4	4	Do. 4 p.c. Red. Deb.	84—86	..	..
600,000	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	71—73*	..	..
484,963	,,	June 29	—	4	Do. 4 p.c. Cons. Deb.	71—73	..	..
150,000	10	Mar. 24	6	6	San Paulo 6 p.c. Pref.	7½—7¾	..	..
135,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	46—49	..	..
270,000	Stk.	Mar. 24	5½	5½	Sheffield A	99—101c	..	..
419,988	,,	,,	5½	5½	Do. B	99—101c	..	..
1,047,000	,,	,,	5½	5½	Do. C	99—101c	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,009,895	Stk.	Feb. 24	5	7	South Met. Ord.	102—104	..	102½—103¾
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	109—112	..	110
1,895,445	,,	July 14	3	3	Do. 3 p.c. Deb.	56—59*	..	57½—58½
794,000	,,	Mar. 10	6½	6½	Do. 6½ p.c. Red. Db.	101—103	+1	..
91,500	,,	Feb. 24	8½	8½	South Shields Con.	104—106d	..	..
1,343,796	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	102—105*	..	104
868,887	,,	June 16	5	5	Do. 5 p.c. Deb.	92—95	..	93½—94½
647,740	,,	Mar. 24	5	5	South'mpton Ord. 5 p.c. max	74—77	..	..
121,275	,,	June 29	4	4	Do. 4 p.c. Deb.	71—74	..	..
350,000	,,	Feb. 24	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
130,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	105—108*	..	110
982,275	,,	,,	6½	6½	Do. B 3½ p.c.	89—92*	..	91
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	95—98*	..	..
181,255	,,	June 16	4	4	Do. 4 p.c. Deb.	70—73	..	..
388,251	,,	Mar. 10	5	5	Tynemouth Con. and New	72½—73½d	+1	..
239,094	,,	Mar. 10	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	87
98,800	,,	,,	5	5	Do. 5 p.c. pref.	83—88	..	87
80,000	,,	July 14	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	117—122	..	..
255,650	,,	,,	7	7	Do. B 3½ p.c.	100—105	..	..
422,525	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
324,000	,,	,,	6½	6½	Do. Wimbledon 5 p.c.	98—103	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	100—105	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	83—88	..	..
88,410	,,	June 29	3	3	Do. 3 p.c. Deb.	52—55	..	..
264,745	,,	,,	4	4	Do. 4 p.c. Deb.	73—76	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

Dividend declarations of the week are the Croydon sliding-scale stock of 3½ p.ct. for the half-year, the Maidstone Company 8½ p.ct. for the year to June, and the Weymouth Company 5 p.ct. for the half-year. The offer by the Reading Gas Company of £30,660 ordinary stock at £85, ranking for a maximum dividend of 5 p.ct., was largely over-subscribed.

The following transactions were recorded during the week:

On Tuesday, Commercial 87, 88, 3 p.ct. debenture 57¾, European 6⅜, Gas Light and Coke 86, 86⅛, 86⅜, 86⅞, 3½ p.ct. maximum 59½, 60½, 4 p.ct. preference 75½, 3 p.ct. debenture 58½, 5 p.ct. debenture 99⅜, Imperial Continental 140, Portsmouth 5 p.ct. maximum 77, Primitiva 17s., 17s. 4½d., 17s. 6d., Sheffield "C" 99, South Metropolitan 102¾, 103, 103¼, Uxbridge 5 p.ct. 87, 5 p.ct. preference 87. Supplementary prices, Hampton Court 5 p.ct. 103, North Middlesex 5 p.ct. preference 85, 85½, Wolverhampton 6 p.ct. preference 95.

On Wednesday, Alliance and Dublin 82 3/16, 84½, British 4 p.ct. debenture 75, Commercial 87, Croydon maximum dividend 79½, 80½, Gas Light and Coke 86, 86⅛, 86⅛, 86¼, 3½ p.ct. 60⅜, 4 p.ct. preference 75½, 75¾, 5 p.ct. debenture 99⅜, Imperial Continental 139, Montevideo 91½, 92, Newcastle 4 p.ct. preference 63½, Portsmouth 5 p.ct. 78, South Metropolitan 102½, 103, 103¼, South Suburban 5 p.ct. 104.

On Thursday, European 6⅛, Gas Light and Coke 86¼, 86⅛, 86⅜, 3 p.ct. debenture 58⅜, Imperial Continental 140, Primitiva 17s., South Metropolitan 102¼, 103, 6 p.ct. preference 110, South Suburban 5 p.ct. debenture 94, Tottenham "A" 110. Supplementary prices, Brighton and Hove 4 p.ct. debenture 73½, 74, Eastbourne 5 p.ct. 119½, 120, 3½ p.ct. 103, 103½, North Middlesex 6 p.ct. preference 105, Southend new 84, 84½.

On Friday, Bournemouth 3 p.ct. debenture 55, 56½, Commercial 3 p.ct. debenture 57, Continental Union 34½, 7 p.ct. preference 86, Gas Light and Coke 86, 86⅛, 86¼, 86⅜, 86⅞, 4 p.ct. preference 75½, 76½, 3 p.ct. debenture 58½, 58⅜, Imperial Continental 139, 140, 141, Primitiva 17s., 17s. 4½d., South Metropolitan 103½, 103⅝, 6 p.ct. preference 110, 3 p.ct. debenture 57⅞, 58½, South Suburban 5 p.ct. debenture 93⅞, 94¼, Tottenham "B" 91, Tuscan 20s. 1⅛d., 6 p.ct. debenture 63½. Supplementary prices, Shanklin 5 p.ct. 100, 100½, Southend 3 p.ct. 84, 84½, Wakefield 5 p.ct. 73½, 5 p.ct. (ord.) 83⅜.

In Lombard Street funds were unusually short, for which apparently the heavy payments for the previous week's Treasury Bills were responsible. Some business was done at 3½ p.ct., but the majority of overnight loans commanded 4 p.ct. Discount rates, affected by the lowering of the New York re-discount rate, underwent a rapid change, and, after an early weakness, finished firmly. Treasury Bills were allotted at the slightly lower rate of £4 6s. 5d. p.ct.

On the Foreign Exchange Market, sterling did not move appreciably on the news of the alteration in the value of money. After touching 4.85 1/16, the price reacted to 4.85⅞. Continental gold exchanges were irregular. Belgian hardened to 34.92⅜. German was higher at 20.42; but Swiss and Austrian were slightly weaker. The Dutch, on the other hand, gave way to 12.12½. French francs at 124 1/16 and Italian lire at 89 3/32 were both unchanged. Spanish pesetas were quoted at 28.71.

Silver was slightly higher at 25 5/16d. per oz.; but Gold was lower than the previous week at 84s. 10½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. The banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

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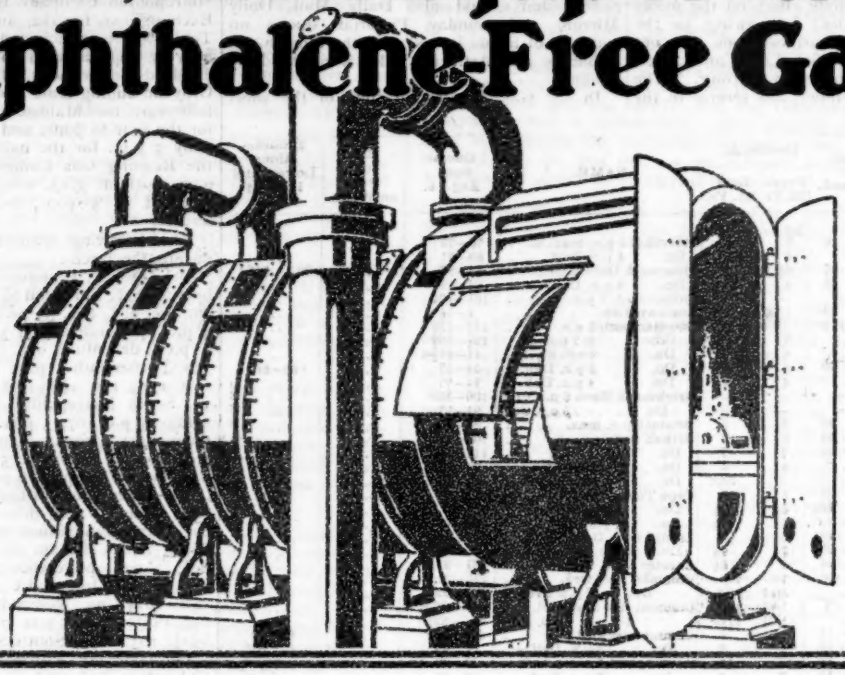

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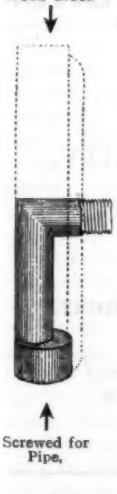

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